AN ANALYSIS OF TOTAL SYSTEM PERFORMANCE RESPONSIBILITY IN AIR FORCE ACQUISITIONS

THESIS

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Christopher P. White

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Abstract

This research examined how well the goals and objectives of total system performance responsibility (TSPR) are being met. The research was sparked by the rise of implementing TSPR as an element of an acquisition strategy in many weapon and information systems. Acquisition professionals use TSPR to decrease total ownership cost, improve system performance, and optimize public-private support capabilities while maintaining operational flexibility. However, while the number of programs that use or plan to implement TSPR or some form of contractor support and sustainment continues to increase, little research has been conducted concerning the effectiveness of TSPR as an element of an acquisition strategy. TSPR transfers performance responsibility and risk to the contractor by giving the contractor more discretion over design, configuration, and requirements solutions. The contractor is also given performance responsibility over the fielded system. The government retains program management as well as budget and contracting functions. Under TSPR the roles and relationship between government and contractor change from oversight to insight.

Research findings indicate that management should carefully consider the appropriateness of TSPR for a given program. TSPR has the potential to be an effective element of an acquisition strategy, but requires contractor innovation, change management, successful long-term partnerships based on mutually aligned goals and consensus among government personnel concerning core activities.

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I. Introduction

Chapter Overview

This chapter provides a top-level background of the research problem. In particular, this section directs attention to the events and concerns that fostered sponsorship of this research by Space and Missile Systems Center (SMC), Detachment 11. This chapter also gives a background of the acquisition environment and events that led to Total System Performance Responsibility (TSPR) as a best practice.

This chapter also discusses the value of this research effort and the contribution it is intended to make to those involved in acquisition or program management decision-making throughout the Department of Defense. The chapter concludes with a research problem statement and the presentation of investigative questions. The problem statement establishes the scope of the research effort. The research questions focus the research effort and facilitate the formulation of propositions. Through the research effort, these propositions are either rejected or not rejected and the results of the research are used to make recommendations concerning the application of TSPR in Air Force acquisitions.

Background

In February 1999, the Joint Total System Performance Responsibility (TSPR) working group was formed to address command and control and funding flexibility problems under TSPR. The working group was specifically chartered to: (1) develop flexible TSPR contractual and budget strategies that recognize year to year budget

changes and prevent "must pay" situations; and (2) develop contractual instruments that allow wing commanders day-to-day control of contractor efforts on base. The work group was championed by SMC/AX and co-chaired by HQ AFSPC/LG. Representatives from Air Force Material Command, Air Force Space Command (AFSPC), and SAF/AQ were active members in this effort.

The group's approach to addressing this issue involved the following steps:

(1) Define the problem to ensure a sound understanding of the problems wing commanders face due to TSPR strategies.

(2) Research a wide range of existing TSPR and TSPR-like programs for best practices and lessons learned. Include Aircraft, Space, ICBM and Army systems.

(3) Brainstorm new approaches. Take advantage of the group's creativity and be sure to address problem areas unique to Space systems.

(4) Develop a report that relates problem areas to strategies or tools that help to resolve them (SMC & AFSPC, 2000:2).

In its research, the group found that no single form of TSPR exists. They concluded that a program's TSPR implementation should depend upon the specifics of the mission and the MAJCOM's requirements. With this in mind a toolkit proved to be the most appropriate approach to providing meaningful guidance in response to the action item. The working group's report included contractual, financial, requirements, and organizational tools that could be used to provide wing commanders with greater command/control and funding flexibility, given a TSPR strategy.

To formulate their toolkit, the working group focused on existing weapon systems that use TSPR-like strategies. After identifying candidate programs from the Army, Air

Force and space systems, the team researched these programs for best practices and lessons learned. The team also identified some Contract Logistics Support (CLS) programs, which, although not TSPR programs, might have lessons learned and best practices for giving commanders command and control through contractor support. Candidate contracts with potential application to space systems of TSPR-like provisions include a Vance AFB support contract, Inter-Continental Ballistic Missile (ICBM), Apache Helicopter, Joint National Test Facility, Joint Direct Attack Munitions (JDAM), F-117, Consolidated Spacelift Range Operations, Integrated Space Command and Control (ISC2), Space-Base Infrared System (SBIRS), Joint Air to Surface Standoff Missiles (JASSM), and C-17.

Note that the working group's charter was not to analyze or assess TSPR as an element of an acquisition strategy. In discussing the charter of the group their report states:

> Some team members believed the action item had been de-scoped from what was originally intended: a large-scale study of the viability of contractor assigned TSPR. Team leaders consulted with senior leadership from both commands to ensure the team properly interpreted the intent of the action item. These discussions reaffirmed that the working group was tasked to focus on strategies/approaches for giving Commanders required resource command/control and funding flexibility given a TSPR strategy decision has already been made. The larger concern still exists as to what extent the TSPR concept should be applied to space systems and whether it should include organizational level maintenance. A second part of this larger question is how to influence organizations, which are key in deciding the scope of TSPR concepts. The team agreed that the larger question is beyond the scope of this action item but must be addressed (SMC & AFSPC, 2000:5).

Due to the limitations and areas for future research resulting from this working group, the need arose for another study of TSPR and its implementation within DoD.

Many of DoD's acquisition reform efforts have led to a TSPR approach in acquisition strategies. In general, we are focusing on validating the "what" of an acquisition and allowing (or mandating) the contractor to propose "how." This transfer of risk to the contractor can be mitigated by ensuring the contractor control over the system for the life of the system through TSPR clauses and through award term contracting.

Research Contribution

AFSC and SMC are in need of a study on the viability of contractor Total System Performance Responsibility (TSPR) for weapon and information systems. The Air Force has been using TSPR-like or various forms of Contractor Logistics Support (CLS) contracts on systems acquisitions for years but has no long-range data on the cost savings or effectiveness of the program.

Since there is no pilot program for TSPR in DoD, this research attempts to report the successes, failures, and lessons learned from TSPR-like contracts studied. This research does not attempt to define a universal model of TSPR implementation, but, at a minimum, this thesis will identify essential elements required to make TSPR successful in any acquisition.

Lastly, this research attempts to provide an unbiased study of TSPR as an acquisition strategy. This subject has the potential to polarize individuals and organizations because a person's opinion of TSPR is often shaped from his background and work environment. By reading this thesis, it is hoped that the reader will come to his own conclusion about the effectiveness of TSPR and how to best implement TSPR as an element of an acquisition strategy.

Problem Statement

In an era of shrinking defense budgets and budget uncertainty, top-level DoD decision-makers continue to look for ways to acquire weapon and information systems better, cheaper, and faster. TSPR has been championed as a best practice in acquisition reform (OSD Deskbook Web Site, 2000). However, while some success with TSPR has been reported in various programs, it is unclear how well the goals and objectives of TSPR are being met. Briefly, the goals and objectives of TSPR are to reduce the total ownership cost of a weapons system, to optimize private/public support capability, to make implementation of TSPR transparent to the end user, and to maintain the operational flexibility of the end users.

The intent of this research is to examine how well the goals and objectives of TSPR have been met in two radically different weapon systems. By conducting an academic exploration and examination of the use of TSPR in weapon systems, future decision makers will be better equipped to refine, tailor, and implement TSPR as an element of an acquisition strategy.

Research Approach

Multiple case study research was the method used to gather and process data. The case study method was selected to gather more in-depth information about the programs than a survey-type of investigation would have revealed. The purpose of multiple case studies was to detect comparative trends between the programs using TSPR as an element of an acquisition strategy. The research used a three-part design to perform an analysis of the current use of TSPR. The parts included:

Validation and selection – The research protocol was reviewed for sufficiency and potential respondents were identified by purposive sampling.

Data collection – System program office personnel, users, and contractors were interviewed using the research protocol.

Data Analysis – The data was analyzed to find trends, which indicated the successfulness of TSPR in the programs interviewed.

Research Questions

How has TSPR affected total ownership costs?

How has TSPR affected performance?

How does TSPR affect public-private support capabilities?

How has the relationship among user (operator), contractor, and program manager changed under TSPR?

How does TSPR maintain operational flexibility?

Research Propositions

Research propositions form the basis for what the researcher expects to observe when gathering data during the research effort. In this research study of TSPR in Air Force acquisitions, five propositions were developed. They are stated in the null case first and the predicted observation follows:

Proposition 1:	Total System Performance Responsibility does not affect total ownership cost.
Predicted:	Total System Performance Responsibility affects total ownership cost.
Proposition 2:	Total System Performance Responsibility does not affect performance.

Predicted:	Total System Performance Responsibility affects performance.
Proposition 3:	Total System Performance Responsibility does not affect public-private support capabilities.
Predicted:	Total System Performance Responsibility affects public-private support capabilities.
Proposition 4:	There is no change in the relationships among contractor, users, and system program office personnel under Total System Performance Responsibility.
Predicted:	At least one relationship changes when Total System Performance Responsibility is implemented.
Proposition 5:	Total System Performance Responsibility does not affect operational flexibility.
Predicted:	Total System Performance Responsibility affects operational flexibility.

Scope and Limitations

The scope of the study reduced the type of programs that were contacted for investigation as case studies. Many Air Force programs are beginning to implement TSPR as an element of an acquisition strategy either for support and sustainment, integration, or for the entire life cycle of a weapons system. However, few programs have a lengthy experience with TSPR. Two programs within Air Force Space Command were selected for study because they have significant history with TSPR and because TSPR appears to have profoundly impacted both of them.

There are other programs outside of Air Force Space Command that have used TSPR, most notably the F-117. A brief write-up of the F-117 is included in Chapter II but was not a separate case study. The sponsor of this research was generally more concerned about the implications of TSPR in Air Force Space Command and Space and

Missile Systems Center. Additionally, while the F-117 has demonstrated some success with the TSPR concept, it is difficult to externalize this success. The F-117 contractor, Lockheed Martin, has the advantages of managing a relatively small fleet of aircraft and a supply chain that is less complex than most weapons programs. In contrast, Lockheed Martin is the prime contractor for the SBIRS High program, which is presented in Chapter IV. This program has used TSPR as an element of an acquisition strategy, but has not achieved the success of the F-117 program.

Because this study is limited to two case studies, it is not intended to build new theory about the application of TSPR in Air Force Acquisitions. However, this study does attempt to test the theoretical benefits of TSPR using the conclusions from the two case studies. Finally, while the study was limited to programs within AFSPC and SMC, the conclusions may have application to other Air Force programs using or considering TSPR.

Chapter Summary and Organization of the Research

This chapter provided an overview of the report completed by the joint TSPR working group and the need for future research into the viability of TSPR. This section also presented a top-level view of the current DoD acquisition environment and how that environment has led to the proliferation of TSPR as an element of an acquisition strategy.

Some proponents of TSPR seek near universal implementation while some opponents are cautious of the proposed benefits. It is believed that by answering the investigative questions, decision-makers will see how well and when TSPR works. Furthermore, while no universal model of TSPR implementation exists, it is believed that

this research will provide decision-makers information on how to effectively implement TSPR.

Chapter II is a literature review, which describes the evolution of TSPR, relationship contracting, and acquisition reform that relates to TSPR. This chapter also attempts to define TSPR and provides a brief history of TSPR in Air Force acquisitions.

Chapter III explains the research methodology. A qualitative method was chosen using multiple case studies. A three-part research design of validation and selection, data collection, and data analysis was used to implement the methodology. An explanation of the research propositions and research variables concludes this chapter.

Chapter IV presents the results of the case study research. Each proposition is individually accepted or rejected after analyzing data gathered during the case studies.

In Chapter V, answers to the research questions are provided. There are also conclusions drawn from the data. These conclusions are used to provide recommendations for the use of TSPR in Air Force acquisitions.

II. Literature Review

Chapter Overview

Before determining how well the goals and objectives of TSPR have been met, it is essential to review the information germane to this topic. The review of related literature is conducted for several reasons. First, it makes known the findings of pertinent research and enables the researcher to avoid duplication of previous research. Second, the review gives the author the insights and understandings needed for examination of the problem in question (Gay, 1987:36). Finally, the review provides information that may be useful in determining how well TSPR-like contracts have worked in other acquisitions previously studied.

The literature review seeks to integrate TSPR into the larger subject of acquisition reform. In addition, the literature review discusses contracting and business principles that are prerequisites to implementing TSPR. Finally, the literature review focuses on the history of TSPR usage and seeks to define TSPR from a number of sources.

Acquisition Reform

During the last decade, the DoD budget has continuously decreased. The rules governing defense acquisition and the nature of the defense market have combined to make weapon and information systems costly while acquisition of the systems has been slow and cumbersome. The Air Force Acquisition web site lists numerous studies of the defense acquisition process have been conducted to determine where schedule, performance, and cost could be enhanced (HQ USAF/AQ, 2001). One of the converging

results of these studies is to reform the acquisition process by adopting the private sector's best commercial practices.

Because of the military's budget uncertainties and decreased manpower over the last decade, the traditional approach of owning a capability or managing a large supplier base through arms length relationships is changing (Rand and Corbin, 1999). The DoD is now embracing a more efficient source management approach. Sourcing management requires integrating supplier capabilities into organizational processes to achieve a competitive advantage through cost reduction, technology development, quality improvement, and cycle time reduction to meet the warfighters' requirements (Monczka and others, 1998: 4). As the need to reduce life cycle costs of major weapon systems increases, it is important for DoD to implement proven commercial sourcing management practices. TSPR incorporates many of the elements of commercial sourcing management, but is specifically tailored to the DoD environment (Navy Acquisition Reform Office, 2000).

DoD Acquisition Environment: Changing Roles.

According to a recent RAND study, one product of acquisition reform has been the change in philosophy and roles of acquisition professionals. Figure 1 illustrates how acquisition roles have changed from transaction oriented to relationship oriented roles. Fewer personnel are required for simplified buying and order processing, but more personnel in the career field are required to handle more complex activities such as requirements definition, best value analysis, and risk management.

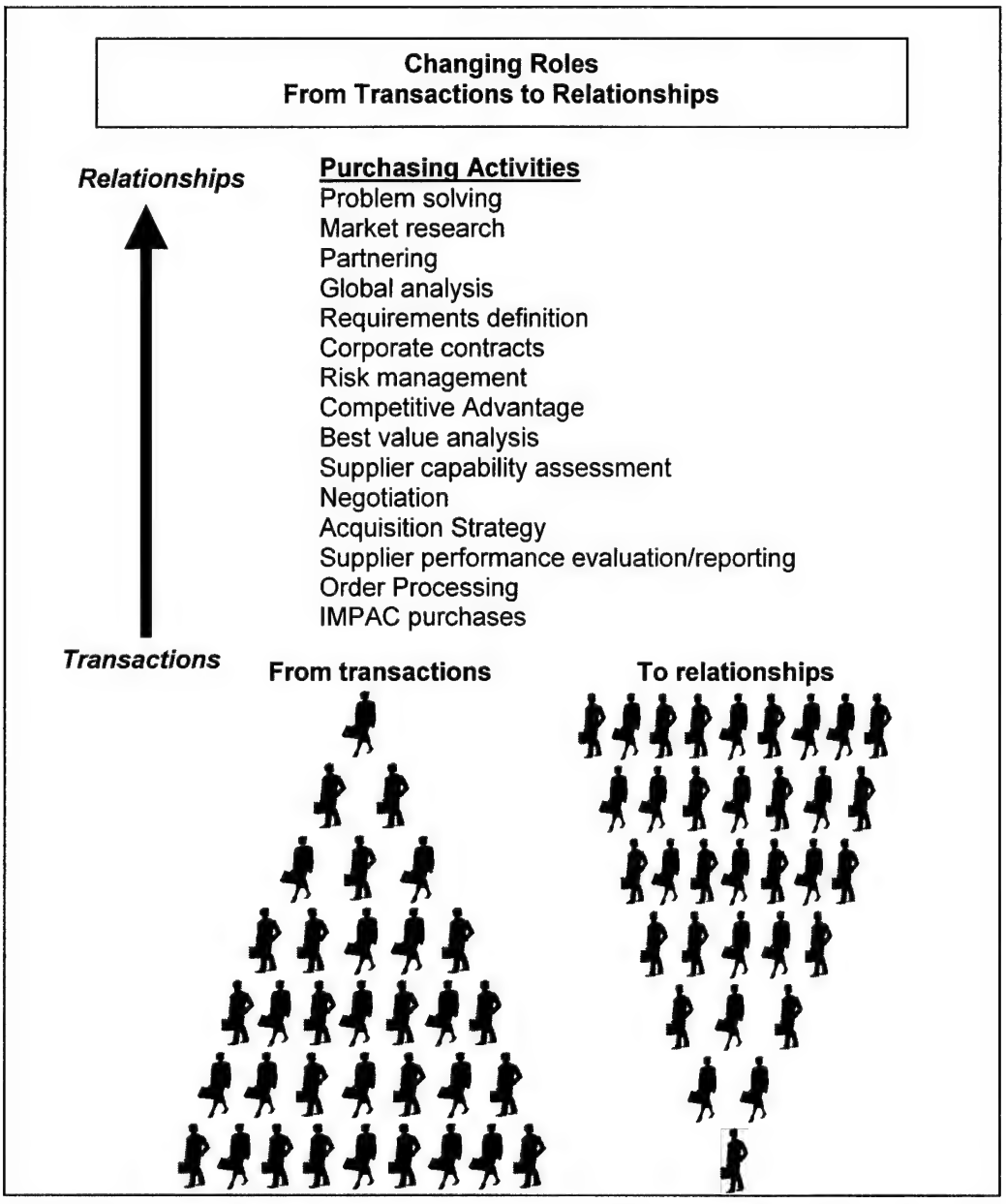

Figure 1: Adaptation of Changing Roles (Rand and Casbon, 1999)

Types of Supplier Relationships

In general, supplier relationships progress along a continuum that is directly related to the level of an organization's strategic plan for purchasing. However, before implementing strategic purchasing procedures, the organization must understand the

range of various supplier relationships. Cavinato proposes a stratified breakout of buyer-seller relationships (Cavinato, 1992):

1) Do not know supplier exists. Do not care.
2) Do not know supplier exits. Might use them if known, though.
3) Arm's length, price-oriented relationship: high value, low risk of obtaining in the marketplace, traditional (e.g., taxicab ride).
4) Price relationship; cooperative from time to time (e.g., returning pallets to the supplier to reduce the price of the next shipment).
5) Price relationship; collaborative over time (e.g., sharing demand forecasts with suppliers so they can level their manufacturing; helps reduce costs).
6) Total cost relationship; cooperating on total supply chain to reduce total costs (e.g., providing performance rather than product specifications to supplier so they can reduce manufacturing costs).
7) Value relationship; linking suppliers to customers to emphasize product/service value.
8) Joint ventures; complementary relationships uniting strong/weak attributes of companies.
9) Vertical integration strategies:
    a. purchasing capital assets for suppliers.
    b. buying supplier and treating as a subsidiary; and
    c. complete vertical integration of the capability

Price is the basis for the first relationships. In types 4, 5, and 6, relationships are characterized by the supplier reducing their costs so the purchasing organization can

obtain the benefits of those reduced costs. In types 7 and 8, the relationships are stronger and become tools of strategy to achieve a competitive advantage. These supplier relationships are characterized by alliances among supplier, procuring organization, and the customer. The relationship becomes a teaming arrangement with the each organization fulfilling its role. The buyer acts as the coordinator and facilitator to meet the customers' need. Although the Government does engage in vertical integration with its contractors, it does provide government furnished property.

Type of Capability Acquired

Acquisition strategies are determined, in part, by the complexity and criticality of the item being procured. Similarly, the purchasing relationship is determined by the category of the capability. According to Kraljic, the capability is determined by two factors: value and risk (Kraljic, 1983: 109-117). As value and risk increase the item being acquired becomes more critical. Furthermore, as the item becomes more critical it becomes increasingly important to use higher-level supplier relationships and strategies. Petrillo provides an integration of the types of relationships and types of capabilities (Petrillo, 1998: 54,56).

Critical Capability (high value, high risk). This is the product, product component, or service that makes being in business possible for the firm. The critical items are central to the firm's distinctive technical capability or core competence. Core competencies are "key" or "fundamental" capabilities that will provide the firm's competitive edge and basis of value creation for the future (Freeman, 1990: 44). For the Air Force, a critical capability would be air superiority. For most firms, there exist only limited sources of critical goods and services, subject to the complexities and

uncertainties of the environment. When procuring critical competencies, the most sophisticated partnering relationships are employed (Kraljic, 1983: 109-117). This type of relationship focuses on customer value as in the relationships of type 7 (value relationships) and type 8 (joint ventures), listed in Cavinato's model. By definition the Air Force's weapon and information systems fall into this category.

Commodities (high value, low risk). These products, product components, or services are part of the high value items necessary for the firm to remain in business. Because of their high value they are like the critical capabilities; however, they are readily available in the marketplace. We expect to see cost reduction relationships associated with these items, like those described by Cavinato in buyer-seller relationship types 4, 5, and 6, above (Kraljic, 1983: 109-117).

Generics (low value, low risk). These are the items the firm needs to do business. They are readily available in the marketplace and have little or no distinctive qualities. There is little or no risk associated with these items, and not much value to be gained by distinguishing one from another. A goal of acquiring generics by most firms is to minimize the time spent acquiring these products. Arm's length, lowest price relationship is the common supplier strategy for these items, like those described in the type 3 buyer-seller relationship (Kraljic, 1983: 109-117).

Distinctives (low value, high risk). These are items that have been overspecified. Because of their low value, they offer no real value to the firm. Additionally, they create risk due to their high cost and their unavailability in the marketplace. Firms are expected to identify and eliminate these types of items, known as bottlenecks in the supply chain (Kraljic, 1983: 109-117).

By plotting requirements against concepts of value and risk, an organization can effectively make strategic purchasing decisions. The two by two matrix of risk and value that defines the categories is shown in Figure 2:

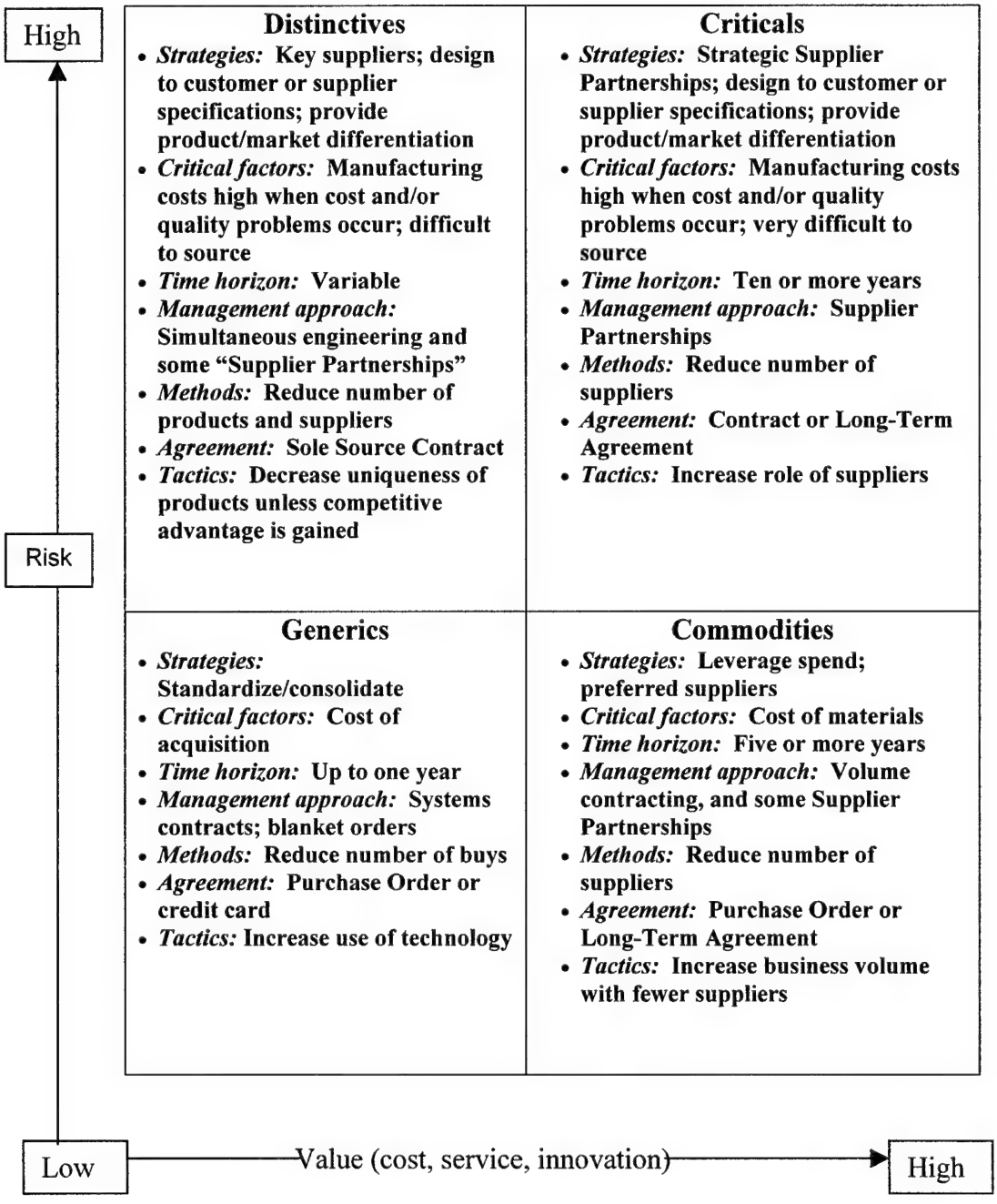

Figure 2: Adaptation of Typology of Capabilities Acquired (Kraljic, 1983)

Strategic Purchasing

The management of longer-term contracts is a key element of strategic purchasing (Monczka and others, 1998: 521-4). Although there may be fewer suppliers, the evaluation and selection of a partner is intense and thorough. Information systems are established or improved because the relationship horizon is expanded. Accordingly, "the ultimate goal of such an information system is to make available to all participants in the supply chain all the information needed at the time" (Meredith and Shaffer, 1999: 500-1). Continuous improvement and joint problem solving are characteristics of the strategic purchasing relationship. Another premise of strategic purchasing is the equitable sharing of benefits (Stuart, 1993: 23). TSPR incorporates most of the characteristics of strategic purchasing. Advanced information systems are stressed and joint problem solving is a must as is continuous improvement. Finally, reward and risk sharing are part of most TSPR contracts through the sharing of cost overruns and underruns.

Purchasing Partnerships. The use of TSPR as an element of an acquisition strategy requires the development and implementation of purchasing partnerships. According to Lisa Ellram, partnering will continue to expand and dominate the purchasing landscape in the commercial sector. Furthermore, these partnerships will become a source of competitive advantage in most industries (Ellram, 1991).

Nonetheless, managing partnerships have proved difficult in the commercial environment and have produced lessons learned. In her article, Ellram lists five basic principles of successful partnerships: trust, communication, mutual benefit, long-term perspective, and top management support in both organizations (Ellram, 1991). While

these five principles form the foundation of successful partnerships, subsequent literature by Bowersox and others suggests that trust is the cornerstone in the buyer-seller relationship (Bowersox and others, 2000: 5).

Adversarial to Collaborative. According to studies on trust in partnerships the element of trust is crucial in moving from an adversarial to a collaborative buyer-seller relationship (Smeltzer 1997; Bowersox and others 2000; Ring and Van de Ven 1994). There is often considerable conflict in the buyer-seller relationship as each party seeks the best financial deal. If neither side fully trusts the other, the potential for achieving improved operating efficiency is limited as companies seek short-term benefits at the expense of their trading partners. However, recent literature by Monzka, Trent, and Handfield and commercial examples demonstrate the leveraged benefits of firms collaborating to achieve common goals.

Supplier relationships in the automotive industry are a prime example. Chrysler has extensively partnered with selected suppliers to achieve the its objectives. Chrysler started by pruning its supplier base. The survivors of the supplier downsizing received more work, but the second phase of the supplier base overhaul began when Chrysler involved these remaining suppliers in product development and process improvement. The second stage required a radical change in the relationship between suppliers. The result is a true partnership with an unimpeded two-way flow of ideas and information (Key Account Research, 2001).

Another example of focused collaborative arrangements has been the developing relationships between Motion Industries and its maintenance, repair, and operating (MRO) suppliers. Motion now invites its suppliers to its annual meeting in San Antonio

in the hopes that supplier attendance will lead to greater levels of cooperation and understanding along the supply chain. According to Michael Gaffney, chairman and CEO,

> "Old paradigms for manufacturers, distributors, and industrial customers are shifting. Where once each operated as independent, almost isolated units, the pressures of cost control, competition, and productivity demand that these three elements integrate more fully, almost seamlessly today." (Avery: 1996, 92)

Involving manufacturers at every level is a step toward the understanding, cooperation, and collaboration needed to bring industrial users the best possible products at the lowest possible cost. Another benefit of the collaboration is an understanding gained by Motion's suppliers of issues affecting Motion and the industry. Because supplier integration is a key part of Motion's supply chain strategy, the annual product fair shares equal billing with financial, sales, service, quality, and other seminars (Avery: 1996: 92).

Although developing collaborative relationships has became a priority in the commercial sector as well as the DoD, collaborative behaviors remain hard to define. Experience in the commercial sector has proven behavioral change difficult to achieve. For the DoD, behavioral change may be even more difficult to achieve given the unique defense acquisition environment that sometimes contradicts partnership development (Templin and Heberling, 1994).

According to Bowersox, Closs, and Stank, there are three changes necessary to enhance firm collaboration:

> "First, true collaboration is not dominated by or self-serving to one party in the arrangement. Collaborative relationships must encourage the mutual trust and value needed to develop and sustain coordinated operations and strategies. There must be a shared vision and objectives among customers and suppliers about interdependency and principles of collaboration…Second, successful collaboration requires structures, frameworks, and metrics that encourage cross-

> organizational behavior. Rules and agreements should clarify leadership roles and shared responsibilities, delineate guidelines for sharing proprietary planning and operational information, and create financial linkages that make firms dependent on mutual performance. They also should encourage risk and benefit sharing by detailing how rewards and penalties are to be apportioned across partner firms...Finally, to be truly effective, collaborative arrangements also must be highly sensitive to the potential negative aspects of interlocking agreements. Specifically, participating firms must be willing to address difficult issues related to relationship de-integration far in advance of the actual need to dissolve a supply chain arrangement." (Bowersox and others, 2000: 4-5)

The behavioral shifts required to enhance collaboration between firms in the commercial sector are also required to enhance collaborative efforts in the DoD acquisition environment, such as TSPR. Trust is one premise of successful TSPR implementation with interdependencies between Government and contractor to achieve the needs of the warfighter. TSPR requires clearly defined frameworks and metrics that encourage cross-organizational behavior and establish the roles and expectations of all parties. Finally, most TSPR contracts encourage risk and benefit sharing through various contract incentives (ICBM SPO, 2000).

History/Definition of TSPR

The first use of a TSPR clause was in the Full-Scale Engineering Development phase (now known as Engineering Manufacturing Development) for the F-15 aircraft in 1970. The airframe manufacturer was provided the F-100 engine as government furnished equipment (GFE), but was responsible for the performance of the F-15. Thus, in its original context, TSPR meant that a prime contractor could be held responsible for a system when that contractor was provided subsystems under concurrent development by another contractor as GFE (OSD Deskbook Web Site, 2000).

TSPR has evolved as a new approach to sustainment as well as development. Under this new approach to TSPR, the focus is on management responsibility vs. development responsibility. Generally, core government functions are identified and all non-core government functions become the responsibility of the contractor with the government retaining core functions. Core government functions usually include the following:

- Program Direction
- Budgeting/Financial Execution
- Requirements Determination
- Contract Management
- Security

One definition of TSPR is found in the Air Force Reduction in Total Ownership Cost (R-TOC), CAIV/TOC Guidebook:

> "TSPR is the acceptance of responsibility to do what is necessary and sufficient to deliver, warrant, and support weapon systems that are affordable, combat capable, and readily available. The Government establishes contractor control and accountability below the system performance specification." (OSD Deskbook Web Site, 1999)

The ICBM Prime Integration Contract uses the following definition of TSPR:

> "...Integration of an entire weapon system, including enumerated subsystems and systems, and the obligation to undertake any and all actions necessary to ensure that the integrated system meets the performance requirements as defined by the Key Performance Parameters (KPPs). In addition, the contractor will also assure no degradation in the system performance because of the incorporation of GFM or GFE into the system. (Having previously agreed to the specification of such material or equipment and having acknowledged that, if achieved, performance of the total system is warranted)." (ICBM SPO, 2000)

The following is typical TSPR contractual language that would be placed in section H of a request for proposal:

Contract provision, Section H, 21, Total System Performance Responsibility (TSPR). This clause specifies the contractor's responsibility for the total integration of the system to meet the contractual requirements. The entire clause follows:

> (a) Total System Performance Responsibility is the responsibility for the integration of the CX Transport Aircraft, its subsystems, components (hardware and software/data) and GFP, including the responsibility for undertaking any and all actions necessary to assure that the total system will meet all requirements as defined in System Specification no. MDC S001. The Contractor hereby accepts Total System Performance Responsibility for the GX Transport Aircraft whether or not such systems (or subsystems, components thereof, or CFP) are fabricated, manufactured, or assembled by the prime contractor, subcontractor (notwithstanding that any such subcontractor shall have been selected pursuant to any provision hereof encouraging or providing incentive for subcontracting with small or small disadvantaged business concerns) or furnished as GFP.
> (b) The Contractor shall be fully responsible for the integration of all systems, subsystems, and components whether GFP or commercially acquired, and hereby agrees that any or all required inspection and acceptance test procedures are accomplished and sufficient to meet specifications.
> (c) Further, the Contractor is required and agrees that all systems, subsystems, and components, whether GFP or commercially-acquired, without resultant degradation of performance of any such item is in addition to and not in substitution of its responsibility to insure that the total system will meet all requirements of the system specifications as provided in Paragraph (a) above; and the requirements of this Paragraph (c) shall in no way excuse the Contractor from compliance with any other requirements of this Special Provision H21.
> (d) All GFP will be integrated into the Aircraft System recognizing the repaired performance tolerances established by the Government for each item. The Contractor agrees to establish acceptance procedures in accordance with the revised tolerances of such equipment.
> (e) Support equipment, both CFE and GFE, is considered an integral part of the system. (AFMC, 2000)

Commercial Support and Sustainment of Weapon Systems

As TSPR has evolved into the arena of operations and support, the DoD has recognized the value of this commercial involvement strategy in meeting its aggressive goals to improve logistic response time and reduce Total Ownership Costs (TOC). To

achieve these goals, "DoD strongly recommends that acquisition programs maximize the use of commercial resources in supporting and sustaining new and modified systems" (Navy Acquisition Reform Office, 2000). By using commercial support strategies such as TSPR, programs can increase the use of commercial practices and distribution systems, seek more competitive sourcing of current in-house work, and greatly expand the purchase of common-use, commercially available items. However, no commercial involvement should be done at the expense of core organic capabilities (HQ USAF/AQ, 2001).

In the course of implementing this policy, five levels of commercial involvement strategies have evolved in sustaining Defense systems (Navy Acquisition Reform Office, 2000). These levels are Virtual Prime Vendor, Direct Vendor Delivery, Contract Logistics Support, Prime Vendor Support, and Total System Performance Responsibility. These levels with definitions, examples, and warranties are illustrated in Figure 3.

In moving across the levels, from left to right, the emphasis is on increasingly vigorous and dynamic partnerships or collaborations with commercial industry. The purpose of these arrangements are to support and sustain advanced defense capabilities for the total life cycle at the lowest practical cost while maintaining adequate organic infrastructure. The concept of increasing commercial support of a system combines depot-level maintenance for non-core workloads with wholesale and selected retail material management functions. The intent is to reduce system TOC, government risk, and to provide continuous upgrade and modernization while compensating for reduced government manning (Navy Acquisition Reform Office, 2000).

	Limited	Contractor Decision Authority			Extensive
Level	Virtual Prime Vendor	Direct Vendor Delivery	Contract Logistics Support	Prime Vendor Support	Total System Performance Responsibility
Definition	A DLA contract for parts support to organic or contractor maintenance facilities or a weapons program	A DLA and/or NAVICP contract for material management	A service or program contract for maintenance and repair of an item, items, or system	A service or program contract for system support and sustainment	A program contract for platform life-cycle performance support and cost
Examples	Piece Parts and Components Hoses, cables, pumps, connectors, circuit boards, motors, etc.		Item or System Multi-platform systems (e.g., GPS, engine), major subsystems, systems, and platforms		Platform Aircraft Ship Missile
			LPD-17 C-17 T-45	C-17 Trainer Apache H-60	F-117 DD-21
Warranties	Supply, component, and workmanship warranties		Reliability and maintainability warranties	Service life and availability warranties	Platform-level material readiness warranties

Figure 3: The Spectrum of Commercial Involvement in Support and Sustainment (Navy Acquisition Reform Office, 2000)

According to the Navy Acquisition Reform Office, a TSPR contract gives contractor increased latitude in the design process for implementing system level solutions aimed at long-term sustainment and Clear Accountability in Design (CAID). Under TSPR, the government continues to control system functional requirements while industry controls design/product requirements. Thus, the contractor is fully responsible for the integration of all systems, subsystems, components, GFP; contractor furnished equipment (CFE), and support equipment and must ensure no performance degradation

after integration. TSPR is most appropriate in new-start situations and represents the most extensive transfer of traditional government decision authority to a contractor. The benefits of a TSPR arrangement include decreased product to user time, reduced costs and data, reduced program office manpower, fewer Engineering Change Proposals (ECPs), reduced TOC, and increased product quality and readiness.

TSPR Goals/Objectives

The concept of TSPR is to transfer performance risk to the contractor while having the Air Force remain accountable for the ultimate execution of a program. Because each acquisition has its own unique requirements, risks, and level of Air Force core competencies, TSPR must be tailored to fit each program. The Air Force remains responsible for its core competencies such as contract administration, program management, and defining and validating the requirements while the contractor accepts responsibility for program implementation (e.g., performance, integration). Because of the change from oversight to insight in program management, the focus is on performance and not day-to-day tasks of the contractor (ICBM SPO, 2000). The TSPR working groups states that:

> TSPR can help implement Reduction in Total Ownership Cost and must meet or exceed Warfighter's requirements. TSPR, when applied in a contractual arrangement with a commercial supplier, gives the contractor greater responsibility for system performance, but also can reduce their risk through "end-to-end" process control. The Government commits to a reasonably stable production program, and supports a long-term pricing strategy. The concept of TSPR makes the prime contractor responsible to deliver, warrant, and support the weapon system as well as develop and field improvements. (SMC & AFSPC, 2000:6)

Furthermore, the goals and objectives of TSPR are to:

> (a) Re-engineer and streamline product support operations resulting in increased performance and lower costs. Provide the opportunity to optimize public/private support capabilities through creative long-term performance based partnerships. Take advantage of benefits of a single responsible organization to ensure overall system performance over the system's life cycle. (b) Make implementation transparent to the warfighter, integrated with "core AF" deployable capability and supply, maintenance, and transportation operating systems and consistent with Title 10 depot requirements. (c) Maintain flexibility in order to meet operational needs. While understanding the TSPR philosophy is relatively straightforward, performing the business case analysis and building an Acquisition Strategy that incorporates it is difficult. It can also be difficult to determine the extent to which TSPR goals and objectives have been or will be (life cycle aspect) reached. (SMC & AFSPC, 2000:6)

Theoretically, the benefits of TSPR are numerous. The government provides incentives for the contractor to continuously improve reliability, insert improved technology, ensure supportability and reduce weapon system TOC (Navy Acquisition Reform Office, 2000).

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Proposals (ECPs), reduced TOC, and increased product quality and readiness (Navy Acquisition Reform Office, 2000).

Organic vs. Contractor Support

One reason behind the increased reliance on contractor support is the potential reduction in depot infrastructure. Under TSPR contracts, contractor profits are linked to total life-cycle performance of a system (Butler, 2001: 73). Because TSPR contracts are usually struck early in a system's life, long-term government contractor partnerships are formed. It is hoped that these partnerships with mutual goals will lead to lower total ownership costs for the government.

One advantage TSPR seems to have is continuity. In the past, when an aircraft was produced, the Air Force would turn from prime contractor and manage the equipment manufacturers directly. Formation of program offices helped perform this task, but individual parts management was scattered throughout dozens of Air Force and DoD agencies. Commenting on TSPR, Grover L. Dunn, Air Force Director of Maintenance said, "We keep [together] the team that was created in production. ...The government can manage the vendor instead of trying to manage all those pieces." (Butler, 2001: 72-3).

Countering the advantages of contractor support and sustainment is the surge capability of a contractor. According to Maj. Gen. Richard N. Goddard, USAF (Ret.), the former commander of Warren Robins ALC, "Private industry maintains capacity to meet current contracts while the public depots must be able to meet day-to-day needs [and] instantly surge to meet wartime demands." (Butler, 2001: 71).

Critics of TSPR also state that the contractor's motivation to innovate and contain costs could erode due to the long-term nature of the contracts. Finally, Thomas L. Miner, executive director of Ogden ALC wrote about the erosion of core capabilities in a memo to AFMC. Miner's memo said,

> Infusion of new technology workloads from new weapon systems is essential to maintain core [repair capabilities]. ...The core determination process is weighted heavily towards older, high-surge workloads. Depots are provided new workloads only after the original equipment manufacturer loses interests." (Butler, 2001: 73 -4)

TSPR in the F-117 Program

On October 1, 1998 Lockheed Martin was awarded a TSPR contract for the F-117 weapons system valued at $1.8 billion over eight years. The type of contract used was a cost plus incentive fee/award fee contract with a 50/50 cost/savings sharing provision. The reinvention of the F-117's entire logistics architecture through TSPR has allowed the system program office to reduce manpower from 226 to 55 members (Aerotech News and Review, 2000).

Using the TSPR concept, Lockheed Martin provides support in program management, engineering technical assistance, depot activities, logistics, parts administration/warehouse operations, subcontract management, and support to the 49th Fighter Wing at Holloman Air Force Base. During fiscal year 1999, Lockheed Martin achieved a score of 100 percent in its performance in the following metrics: spare parts availability, timeliness and quality of depot-delivered modified aircraft, deficiency report response time, and weapon system trainer availability. Additionally, the TSPR arrangement was put to the test through the support of high-tempo operations during Operation Allied Force. The contractor filled critical F-117 spares requirements to

aircraft deployed in Italy and Germany during the 77-day air campaign. During the campaign, the contractor was able to keep F-117 mission capable rates well within Air Combat Command standards (Aerotech News and Review, 1999).

By choosing TSPR for the F-117 program the Air Force set goals for reducing the system program office size, reducing logistics support costs, and maintaining a high level of support to the F-117 fleet. The F-117 program was also one of six initial Defense Systems Affordability Council Total Ownership Cost Reduction pilot programs. The decrease in systems program office personnel accounted for more than a $7 million dollar savings personnel costs for the first year of the contract. Because of the reduced personnel and logistics costs, the F-117 program received the Hammer Award sponsored by the National Partnership for Reinventing Government, which was chaired by then Vice President, Al Gore.

The Army's Apache Program, Prime Vendor Support

The Army is employing a closely related concept to TSPR in the operation and sustainment of its Apache helicopters. The Prime Vendor Support contract for the Apache weapon systems establishes a single focused Apache contractor team to provide reduced cost of ownership, performance-based logistics, and technology insertion. Three main contractors, Boeing, Lockheed Martin, and General Electric compromise Team Apache Systems (TAS).

According to a briefing by TAS, the Army maintains program control, inventory ownership, and incentives to optimize contractor performance. TAS has responsibility for the sustainment of the industrial base, configuration control, and proactive

obsolescence responsibility. TAS also has the added flexibility provided in the PVS contract to meet these responsibilities (Army Logistics Readiness Center, 1999).

The contract has already realized some total ownership cost savings. In five years the operation and sustainment cost savings has been $280 million, obsolescence avoidance has been projected at $255 million over a ten year period, and material expenditures have decreased by 32 percent over five years (Army Logistics Readiness Center, 1999).

Foreign Corporation and Military Examples

The development of buyer-seller collaborations and assumption of performance risk by the supplier is not limited to domestic firms and the DoD. One example of partnering in the foreign aerospace market is the leasing arrangement between Eurowings, Germany's largest regional airline and British Aerospace Asset Management-Jets. Over the last seven years the two firms have collaborated to achieve mutual goals. With requirements input from its customer, the British Aerospace BAe 146 aircraft has become the benchmark 100-seat regional jet for Europe. Eurowings has demonstrated a commitment to British Aerospace through several long-term lease contracts. Through these contracts, British Aerospace maintains an effective zero-idle fleet and works with buyers on the planned and selective disposal of aircraft (Aerotech News and Review, 1997).

The Norwegian Navy Material Command is preparing to contract for a new line of navy frigates with a contract team compromised of Spanish shipbuilder Empresa Nacional Bazan and Lockheed Martin. Lockheed Martin will provide the integrated weapon system for the new frigates, but Empresa Nacional Bazan will be the integrated

platform system supplier. Therefore, the Spanish shipbuilder will have performance responsibility over the entire platform and will warrant the Lockheed Martin weapon system. In preparing for contract negotiations, Lockheed Martin has proposed an extremely comprehensive process for establishing long-term relationships with key members of the Norwegian defense industry. These relationships are needed to obtain Norwegian contractor participation in the design, production, and support of the system. The Lockheed Martin integrated weapon system is compromised of systems provided by domestic, Norwegian, and other international companies. However, Empresa Nacional Bazan assumes responsibility for the entire platform (Aerotech News and Review, 1999).

Chapter Summary

The practice of collaboration and integrated supplier partnerships in American businesses has increased over the last decade. Similarly, the DoD has attempted to adopt some of the best sourcing management practices in the commercial sector and use them to reduce life cycle costs of DoD weapon systems. There is an increasing emphasis in the acquisition community to focus more on relationships and less on tasks in order to develop best sourcing management practices. The use of TSPR as an element of an acquisition is a natural extension of the collaboration, partnering, and integrated supplier development promoted in acquisition reform.

This chapter has listed some definitions of TSPR and given a brief history of its use. In addition other contractor support strategies were listed, and compared to TSPR. Finally, this chapter provided examples of TSPR or TSPR-like contracts in current use.

The next chapter presents the research design. A qualitative method was developed using multiple case study analysis. The research design and a discussion of the research propositions are included.

III. Research Methodology

This chapter details the research design selected for the analysis in Chapter IV. A qualitative method was selected using multiple case studies and a comparative analysis. The data sources are discussed followed by a description of the measures taken to ensure quality of the research. The relationship between the research questions and the interview questions is identified. Finally, a discussion of the data analysis process is provided and the research methodology is summarized.

Case Study Design

Although the terms qualitative and case study are frequently interchanged, they are not synonymous. Case studies can rely on the use of qualitative data, quantitative date, or a combination (Yin, 1994: 14). This method may include a single and multiple case design. Multiple case studies are undertaken to replicate and/or test a previous study (Yin, 1994: 45). This means that the data observed are similar across several cases and are used to draw conclusions. This approach is taken to ensure that the observed phenomenon is not a rare case. The use of multiple case studies is different from sampling logic in quantitative studies, where the results of a number of samples are assumed predictive of the entire population (Yin, 1994: 47).

The qualitative method is distinguished by the researcher's interaction with the subjects while gathering data. Categories derived from the study are not precisely identified beforehand but emerge as the study goes on (Creswell, 1994: 7). Creswell also states that information may be verified by observing the pattern in different categories. This TSPR study is characterized by the interactive nature between the researcher and the

subjects in question. The interviews completed by the researcher took place over the telephone or in person. Any follow-up questions were asked immediately to clarify points in the research. As possible patterns in the data developed, the interview feedback was modified to aid the search for patterns in the data.

The qualitative method is often used to investigate a new topic whose characteristics are still unknown. This is known as exploratory research and is used because no model has been developed about the topic (Creswell, 1994: 9). "The social sciences are filled with concepts that are difficult to operationalize for scientific analysis" (Petrillo, 1998: 87). For example, it is easier to discuss supplier relationships than it is to observe their application or measure their value. Latent variables, such as trust, sometimes affect the factor but are unobservable and difficult to test quantitatively (Petrillo, 1998: 87).

Inductive and Deductive Reasoning.

Theory or theoretical model based research consists of a few repeating steps: induction, deduction, and tests. After testing, the results contribute to another induction, and the sequence begins again. The induction phase develops general relationships that may explain specific observations. Deduction derives specific assertions from general principles. Therefore, induction moves from the level of observation or indicator to the level of theory or constructs. Conversely, deduction moves to the level of theory to the level of observation (Dooley, 1995: 65-66).

The use of total system performance responsibility (TSPR) as an element of an acquisition strategy is discussed in the literature. However, no previous research data is available with regard to the usefulness of TSPR. Case study methodology has a

distinctive advantage when asking "how, what, or why" questions about a contemporary phenomena "over which the investigator has little or no control" (Yin, 1994: 5- 9). This research concerns itself with the inductive phase of the research cycle as proposed by Dooley. The literature review, and the interview observations and information collected propose order to the data through inductive reasoning. Because of the researcher/subject interaction required, of the exploratory nature of the study, and of the inductive reasoning the qualitative method was chosen as the appropriate method. Although this research does not attempt to build theory, it does attempt to reasonably answer the research questions.

Sources of Data

The selection of TSPR contracts was by purposive sampling. In purposive sampling, the researcher chooses which cases to include as opposed to random sampling. The cases included in this research are two dissimilar TSPR contracts within Air Force Space Command and Space and Missile Systems Center. These cases are of interest to the sponsor of this research and have more data than other candidates. For each case, the research includes interviews with the system program office, contractor, and operations and sustainment personnel. The programs studied were identified through a search of Air Force Space Command and Space and Missile Center acquisitions currently using TSPR.

Literature and archival sources of data such as books, journal articles, professional magazines, regulations, contract documents, and contract files relating to the traditional approach to long term contracting, strategic purchasing, and award term incentive were analyzed. This effort was undertaken to discover the characteristic and relationships of Air Force strategic purchasing. This enabled the researcher to look "for

constructs that bring order to the descriptive data and that relate these data to other research findings reported in the literature" (Gall et al., 1996: 549).

ICBM Program Integration Contract. In 1954 the Secretary of the Air Force made the decision to develop and field ICBM weapon systems. From the beginning, the ICBM management structure was based on a SPO that functioned as the weapon systems integrator. The SPO was made up of government personnel and an in-house Systems Engineering/Technical Assistance (SE/TA) contractor. Before TSPR, the SPO contracted directly with individual Associate Contractors (ASCONs) to provide hardware and software to the system.

In addition to contracting, the SPO also integrated the individual portions of the system. To aid in integration, the SPO sometimes required the support of a systems integration contractor. The need for contractors resulted in excess of 150 SPO-managed contracts. These contracts were for hardware, software, and engineering support.

Although the system had an excellent safety record, the manpower intensive management process became increasingly unaffordable. On December 22, 1997 the Air Force awarded the Prime Integration Contract to TRW, the former system engineering/technical assistance (SE/TA) contractor. This contract places TSPR on TRW, who now acts as the weapon system integrator. The change to TSPR was an effort to alleviate the problems of administering over 150 ASCON contracts and to transfer the integration responsibility from government to contractor. Under TSPR, the SPO was empowered to eliminate the SE/TA contract, place future hardware and software buys on the prime contract, and also bring all sustaining engineering support under the purview of the prime. (Ludwig and others, 1999: 68-9).

Because the contractor operates primarily as an integrator, the maintenance and sustainment of the system are still performed by government personnel at the public depot. However, the new Inert Repair Center (IRC) is a contractor-leased facility that will have contractor and government personnel working together on the Propulsion System Rocket Engine (PSRE) Life Extension Program (LEP). In this arrangement, government production supervisors will take direction from the prime contractor while working on PSRE LEP (ICBM SPO, 2000).

SBIRS High. The mission of SBIRS is to develop, deploy, and sustain space-based surveillance systems for missile warning, missile defense, battlespace characterization, and technical intelligence. SBIRS is intended to be a consolidated flexible system that meets the needs of United States infrared space surveillance through the next twenty to thirty years. SBIRS is intended to be an integrated "system of systems" including multiple space constellations and an evolving ground segment (Space and Missile Systems Center, 2000). The systems that compromise SBIRS are Defense Support Program (DSP), SBIRS Ground, SBIRS High, and SBIRS Low. The integrated program schedule for this system of systems is illustrated in Figure 4.

The SBIRS High Engineering and Manufacturing Development contract was awarded in November 1996 to Lockheed Martin. The EMD will be a ten-year effort. When the system is fielded, the contractor will be responsible for all system sustainment. Air Force personnel will still perform tech control, however (SMC & AFSPC, 2000: 28).

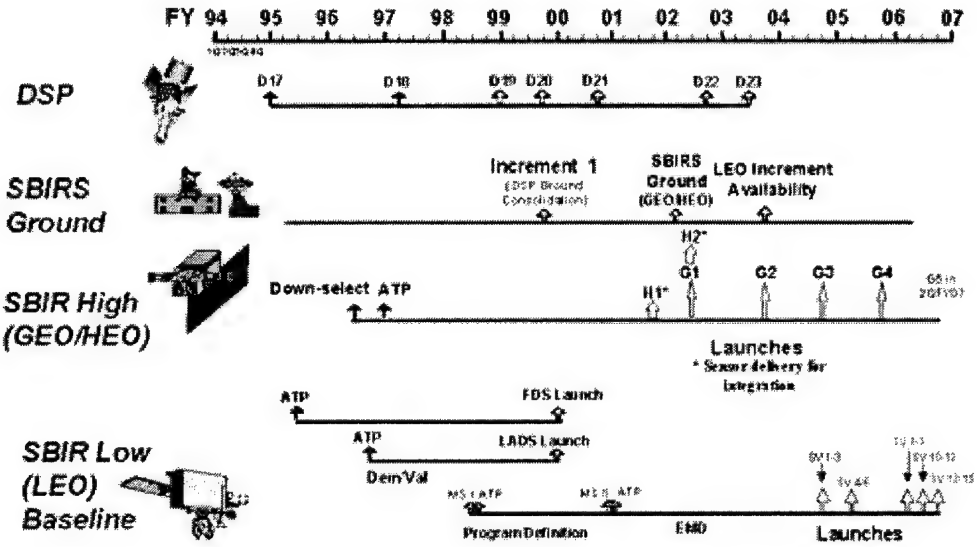

Figure 4: SBIRS Integrated Program Schedule (Space and Missile Systems Center, 2000)

Protections of Quality

A case study methodology, like all research designs, needs to ensure standards of quality are met for construct validity, internal validity, external validity, and reliability (Yin, 1994). Actions to assure quality in each area are discussed below.

Construct Validity. This research effort uses two tactics that Yin recommends to ensure construct validity. First, data is collected from multiple sources, to ensure the TSPR construct is valid among different programs. Triangulation of data sources and of theory-based perspectives on the same data was accomplished where possible. A second tactic used is to establish a chain of evidence. Yin recommends case study database development. Further, the research report should cite relevant portion of that database:

> The principle is to allow an external observer or reader of the case study, for example—to follow the derivation of any evidence from initial research question to ultimate case study conclusion (Yin, 1994: 98).

Internal Validity. Literature with similar findings, such as partnerships and collaborative efforts in the commercial sector, link the characteristics and key elements of

TSPR, which strengthens the internal validity and widens the generalizability to a higher conceptual level (Eisenhardt, 1989: 544). As recommended by Yin, pattern matching was used to ensure internal validity. Yin says that pattern matching helps to ensure that inferences about data collected are correct.

External Validity. Analyzing data with in the framework of several established commercial strategic purchasing models contributes to the external validity of the research (Ellram 1995; Stuart 1993; Ring and Van de Ven 1994). Analysis of multiple cases aids in the discovery of any replication of phenomena across cases.

Reliability. Yin recommends that a case study protocol and database be used to ensure the final quality criterion of reliability. Case study procedures for this research were documented in the protocol and study databases that are discussed in the next section.

Data Analysis

Participants in the research were informed of the goals of the study. Participants were guaranteed confidentiality in order to encourage open, honest discourse during interviews. Data collected was known in detail only by the researcher (Schmitt and Klimoski, 1991). The data associated with individual cases was summarized on an overview basis to protect confidentiality. Analysis is reported on a cross-case basis to ensure anonymity (Yin, 1994).

The interviews for the ICBM case study were conducted at Hill AFB and at contractor's facilities. In total, eleven people were interviewed. Their experience varies from contractor management, system program office management, and user functions.

The interviewees range from major equivalent to colonel equivalent in rank. Management personnel from the prime contractor, TRW were interviewed as well.

The interviews for the SBIRS case study were conducted by phone and at Peterson AFB. In total, six people were interviewed. Their experience varies from contracted systems analyst, system program office personnel, and support and sustainment functions. The interviewees range from captain equivalent to lieutenant colonel equivalent in rank.

In a qualitative study, the researcher is considered the primary instrument of data analysis (Creswell, 1994: 45). However, to organize data gathering, a protocol or form is needed. The protocol for this research is an open-ended set of questions designed to allow a natural flow of conversation. The cases in this research are investigated using the same protocol, which helps to identify patterns in the data. Thesis questions are mapped to the study's research questions where possible. The questions represented reminders to the researcher of the data to be collected, as recommended by Yin (1994). Schmitt and Klimoski characterize interviews as "conversations with a purpose" (1991: 139). The questions addressed to research participants are open-ended and dynamic in order to facilitate rich discourse.

Research Questions

Once the scope and purpose of this research was identified, constructing research questions was necessary to focus this qualitative study. The research questions became topics that were explored in interviews and other data gathering activities. After reviewing the literature, these questions were used to construct propositions about the expected results. The following research questions were used in this study:

1. How has TSPR affected total ownership costs?

2. How has TSPR affected performance?

3. How does TSPR affect public-private support capabilities?

4. How has the relationship among user (operator), contractor, and program manager changed under TSPR?

5. How does TSPR maintain operational flexibility?

Research Propositions

After identifying what is to be answered through the research questions, the emphasis turns to proposition construction. The propositions in this study are used to identify theoretical issues and provide direction in the search for evidence (Yin, 1994: 21). After completing the literature review, five propositions were identified to match the research questions listed above. The propositions are stated in the null case first with the predicted outcome of the research following. Then, the rationale and support for the predicted outcomes are listed along with the key requirements that must be present in order to reject a proposition.

Proposition 1: Total System Performance Responsibility does not affect changes in total ownership cost.

Predicted: Total System Performance Responsibility affects total ownership cost.

Rationale:

TSPR promises to initially reduce total ownership cost by reducing manpower within the Government. The two cases used in this study experienced a significant reduction in manpower due to TSPR. Additionally, by transferring life-cycle responsibility to the contractor, some would argue that cost savings might be achieved.

One example of potential cost savings is parts management by the contractor. GAO has recently criticized the DoD's inventory and parts management for its lack of cost effectiveness (GAO, 1999). Therefore, it is reasonable to believe a contractor using best commercial purchasing practices could create savings for the Government in this area.

In order to reject this proposition, the case studies must show significant cost savings, reduction in total ownership cost, or significant cost escalation that is attributable to TSPR. These savings or cost escalation may be compared against program costs before TSPR or the estimation of continued program costs without using TSPR.

Proposition 2: Total System Performance Responsibility does not affect performance.

Predicted: Total System Performance Responsibility affects performance.

Rationale:

Under TSPR, the contractor is incentivized to meet or exceed performance requirements through various contractual incentives, e.g., award fee, incentive fee, cost overrun/underrun sharing. Some TSPR-like contracts state increases in performance as goals in the contract. The Army's Apache Helicopter is one example. To reject this proposition the data must show a significant increase in performance such as an increase in the reliability percentage of the weapon system, an increase in the availability of the weapon system, or a significant improvement in the maintainability of a weapon system. A goal of the new Apache TSPR-like contract is to improve availability by 85% (Army Logistics Readiness Center, 1999). Meeting this goal would demonstrate TSPR's affect on performance.

Proposition 3: Total System Performance Responsibility does not affect public-private support capabilities.

Predicted: Total System Performance Responsibility affects public-private support capabilities.

Rationale:

The intention of TSPR is to employ the best business practices of the commercial environment and the DoD environment. However, to demonstrate the optimization of public-private support capabilities, the data must show that the mix of public-private support is optimal. That is, the added responsibilities of the contractor do not encroach on Air Force core competencies or erode core competencies. Also, there should be consensus among all parties (program office, contractor, user, and maintainers) that the mix of public-private support is optimal.

Proposition 4: There is no change in the relationships among contractor, users, and system program office personnel under Total System Performance Responsibility.

Predicted: At least one relationship changes when Total System Performance Responsibility is implemented.

Rationale:

The employment of TSPR as an element of an acquisition strategy requires a major cultural change among all parties. The system program office changes its role of oversight to insight. The contractor is required to increase its level of innovation by formulating how the system will work instead of having the "how" dictated by the system program office. The system program office then evaluates the contractor's approach. The user has even more interaction and dependence with the program office and the contractor. To demonstrate the changes in relationships the data should show the

progression from an arm's length transaction based contract to a partnership with the contractor. Collocation with the contractor and increased openness of communication is evidence of a relationship change. Other tangible evidence of relationship changes are increased user involvement in communications with the contractor, award fee determination, and requirements definition.

Proposition 5: Total System Performance Responsibility does not affect operational flexibility.

Predicted: Total System Performance Responsibility affects operational flexibility.

Rationale:

A goal is TSPR was to be seamless or transparent to the end user. However, the long-term nature of TSPR contracts may affect funding flexibility by creating "must-pay" bills. Also, the added layer of contract management may affect operational flexibility for those programs that choose total contractor support for operations and sustainment. Unlike military maintainers, contractors are not directly subordinate to user decision-makers. To reject this proposition, the data should demonstrate constraints placed upon operational decision makers due to TSPR contracts. These constraints can be the lack of funding flexibility or the loss of surge capability by not having authority over contractor personnel.

Research Variables

After the propositions were constructed, research variables were created to form categories derived from the expected responses to the research protocol. The variables and corresponding definition are listed in Table 1.

Table 1, Research Variables

Proposition	Variable	Definition
1	Cost	The total ownership cost of a program using TSPR.
1	RTOC	Reduction in total ownership cost achieved through the TSPR contract structure.
2	Performance Criteria	Goals of the contractual relationship that are used to evaluate its success.
2	Evaluations	Feedback on the success of the TSPR contract.
3	Core Activities	Activities that the organization considers as vital and setting them apart from competitors in their market. Core activities will not be part of the TSPR contract.
3	Non-Core Activities	Activities that may be considered for outsourcing or transfer of responsibility under a TSPR contract.
3	Capability	Additional functions or expansion of current functions that an organization implementing TSPR seeks such as increased capacity or flexibility of resources.
3	Compatibility	The ability of two organizations involved, and their supporting systems, to work together.
4	Contract Terms/Conditions	Clauses and provisions of the contract that assign risk and responsibility and consideration.
4	Communication	Information passed among contractor, user, and system program office during all phases of the acquisition.
4	Incentive Structure	The method of rewarding the contractor for the transfer of risk under TSPR and the level of involvement and input all parties have in determining contractor incentives.
5	Mission Risk	The risk of failure in complying with the mission of the user.
5	Resource Control	The operator's ability to control funds, personnel, and other resources to meet mission requirements.

Measures of Research Variables

In gathering the research data, specific measures are expected to be coded against the research variables. These measures aid in the decision to reject or not reject a proposition. It is important to note that the non-rejection of a proposition is not the same as accepting the proposition as true. Non-rejection means the researcher was unable to prove the proposition false. In Table 2, each variable is listed with the actual associated measures and decision criteria for rejecting the proposition associated with the variable.

Table 2, Variable Measures and Decision Criteria

Variable	Measures	Decision Criteria
Cost	Initial contract savings, personnel savings,	Greater than a 20 percent reduction in total ownership cost over the life of the contract when compared to a similar Government only or pre-TSPR effort
RTOC	Earned value analysis reported and agreed upon by both contractor and government	Positive RTOC, no minimum amount, but some demonstration of cost reduction
Performance Criteria	Accuracy, reliability, availability, survivability	Meet the goals in increased performance established in TSPR arrangement or a 10 percent improvement in performance criteria
Evaluations	Specific GAO conclusions, findings on performance	Conclusions of increased performance in reports pertaining to the program
Core Activities	Program management, contract management, requirements definition, security, financial execution	Consensus among government personnel in identifying their core activities, agreement that core activities have not been outsourced
Non-Core Activities	Design, development, some operation and support activities	Consensus among government personnel in identifying their non-core activities
Capability	Surge capability, subcontractor management, contractor innovation	Consensus among interviewees that contractor TSPR contract adds value to system or performs outsourced functions better than the government could perform the same functions
Compatibility	Adaptation to change, cultural fit of firm and government	Consensus among interviewees that the firm and the government work well as a team and that both parties share the performance, cost, and service goals of the program
Contract Terms/Conditions	TSPR clause	Specific TSPR clause that assigns risk and performance responsibility to the contractor
Communication	Meetings, collocation, site visits, written communication	A significant increase or decrease in communication evidenced by interviews.
Incentive Structure	Cost/savings sharing, award fee, incentive fee	Changes to the incentive structure that reflect changes in roles; e.g., greater user participation on award fee board
Mission Risk	Compromised of surge capability, contract performance risk	Evidence through interviews and past experience of an increase/decrease in mission risk due to TSPR contract
Resource Control	Ability to modify contract funding, authority over personnel resources	A significant change in the ability of operational commanders to control human and financial resources due to TSPR arrangement

Summary

The primary aim of this exploratory, qualitative case study was to test the assumption that TSPR contracts are meeting their goals and objectives. This study attempts to identify the characteristics and examine the factors affecting the Air Force strategy of transferring performance risk and responsibility to the contractor through TSPR contracts. This study also examines the affects long-term contractor relationships and motivating contractor performance through control over an entire weapon system and longer contract term incentives. The research was stimulated by the acquisition strategy direction provided by the Secretary of the Air Force, Deputy for Acquisition to implement TSPR as a best practice and by the concern of the warfighters regarding operational and funding flexibility and transparency.

Several steps were taken to ensure the quality of the research. Two dissimilar contract actions using TSPR clauses were researched. The multiple-case study design and the use of broad investigative questions facilitated discovery of compelling and robust findings.

Results of this exploratory research are reported and analyzed in the next chapter. The findings will facilitate future research that will be possible after TSPR has been more fully executed. Results also will assist decision-makers as they continue to develop policy guidance necessary to ensure successful implementation of TSPR.

IV. Results and Analysis

Introduction

The results of the data gathered for this thesis and an analysis of the information are presented in this chapter. The chapter implements the data collection and data analysis portions of the three-part research design introduced in Chapter III. The research propositions, stated in the null case, are identified. Next, the predicted outcome of the research is listed for each proposition and the rejection or non-rejection of the research proposition is indicated. A discussion of the reasoning for each decision follows. Finally, the applicability of the research variables for each proposition is presented.

Proposition 1

Proposition 1: Total System Performance Responsibility does not affect total ownership cost.

Predicted: Total System Performance Responsibility affects total ownership cost.

Variables: Cost, RTOC

Results: The proposition is rejected.

Analysis of Proposition 1. Cost is the primary reason given for the use of TSPR as an element of an acquisition strategy. By using TSPR, it is hoped that the DoD will capture savings in a number of ways. First TSPR has the ability to greatly reduce personnel costs at the systems program office level. Also, by transferring the integration role or even the complete sustainment of a weapon system to the contractor, it is theorized that best commercial practices employed by the contractor will result in life cycle cost savings. Furthermore, the partnering arrangement should provide cost savings

through mutual dependencies created by the arrangement, linkages to financial success through contract incentives, and a proactive problem-solving environment.

In the analysis of the two programs researched for this thesis, personnel reductions were achieved in operations and sustainment, systems program office, and contracted personnel. The ICBM system program office realized a 30 percent reduction in manpower due to the elimination of the old Systems Engineering/Technical Assistance (SE/TA) contracted function and the cumbersome Associated Contractor (ASCONs) structure. These personnel reductions helped the program achieve its initial contract savings. Figure 5 lists the ICBM's contract and relationship structures:

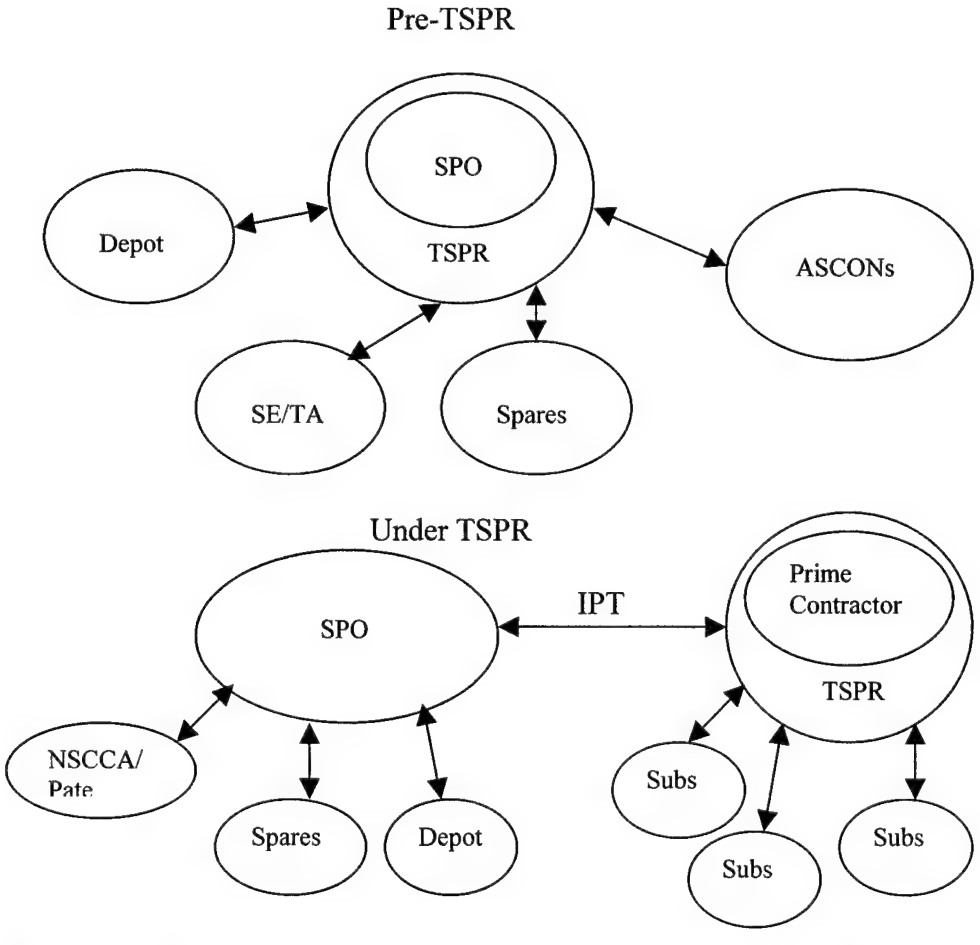

Figure 5, ICBM Contractual and Relationship Structures (ICBM SPO, 2000)

The Spaced Based Infrared System program reduced government manpower after the TSPR contract was awarded. After TSPR was implemented, operations and sustainment at Peterson AFB will is decreasing from 107 personnel in 1992 to 41 personnel by 2006, a 62 percent reduction.

The ICBM Program Integration Contract (PIC) claimed a $1.2 billion dollar savings over the fifteen-year contract based on the government estimate to continue with the government as the integrator versus the proposal received from the winning contractor, TRW. In addition to the cost savings the ICBM program has seen Reduction in Total Ownership Cost (RTOC) savings as well. In the first year of the contract, RTOC savings amounted to $7.3 million and could be attributed to the incentive structure of the contract. The second year provided $2.3 million in RTOC savings before award fee.

The ICBM PIC is structured as a cost plus award fee contract with the base fee set at zero percent. There is also a 50/50 share on all cost savings, which encourages innovation and obsolescence management. In the area of obsolescence management there has been significant activity by the contractor to control sustainment costs. This is especially important in this contract. Unlike most TSPR contracts, the ICBM is an older weapon system and obsolescence is a higher risk factor than in newer programs.

There is one challenge to the proposed $1.2 billion in savings. As noted in a GAO report,

> "...The estimated savings could be inflated because the program office (1) did not identify whether internal improvements to current performance were feasible to reduce program costs in the out years and (2) made the assumption that actual program funding in future years will be the same as the funding requested." (GAO, 2000: 15)

Despite these legitimate questions of the ICBM savings, it is reasonable to conclude that TSPR has resulted in significant cost savings. The contractor has almost forty years of experience with the program and is uniquely qualified to provide and apply management practices that result in savings. The structure of the contract fosters cost savings efforts through a well-defined award fee process and cost savings sharing incentives.

The SBIRS High contract does not provide as clear of an analysis. There is no before and after picture to compare with the TSPR contract cost. According to many of the interviewees, the funds taken out of the program in the early part of the TSPR implementation had a negative impact on performance. While the SBIRS program has realized savings in reduced personnel, it is unclear whether the TSPR approach has been more cost effective than a traditional acquisition approach. The contractor claimed savings by offering contractor system support once the system is fielded. However, these CLS and TSPR elements are will not go into effect until 2006. When the system is completely fielded, a clear determination of development and sustainment cost savings can be made.

Analysis of Proposition 1 Variables.

Cost – Cost was one factor mentioned frequently in the decision to use TSPR as part of an acquisition strategy. The life cycle costs of a weapon system were mentioned in the acquisition costs associated with source selection, the personnel costs of system program office personnel and end user personnel, and the cost to design, build, test, manufacture, operate and sustain a fielded weapon system.

RTOC – The Reduction in Total Ownership Cost was a major goal cited by all of those involved in a program using TSPR. Cost was a major factor for entering into a

TSPR arrangement with a contractor. However, once the TSPR partnership was formed the RTOC effort became the continuous improvement of the operating efficiency of the program. RTOC was most often used in conjunction with certain contractual incentive provisions, especially cost savings sharing.

Table 3, Initial Contract Savings

Program	Government Estimate	Contract Award	Savings
ICBM	$4.9 Billion	$3.7 Billion	$1.2 Billion

Table 4, ICBM RTOC Savings

	FY 98, Millions	FY 99 Millions
Basic Option Target Cost	$83.0	$120.5
Add-on Programs Target Cost	$23.1	$3.3
Total	$106.1	$123.8
Actuals/EAC	$98.8	$121.5
RTOC Savings	$7.3	$2.3

Proposition 2

Proposition 2: Total System Performance Responsibility does not affect performance.

Predicted: Total System Performance Responsibility affects performance.

Variables: Performance criteria, evaluation reports

Results: The proposition is not rejected.

Analysis of Proposition 2. One of the goals of TSPR is to improve the performance of a weapon system for the end user. Increases in performance are often stated as quantifiable goals and are pre-determined before contract award.

Of the two programs studied, the ICBM PIC offers some evidence for rejecting this proposition. During the first years of this fifteen-year contract, the integrating contractor has consistently met or exceeded all performance criteria. Performance criterion comprises 45 percent of the award fee for a given period and is defined by four categories: accuracy, reliability, availability, and survivability. An unsatisfactory score on performance equates to zero award fee for the period. Although the contractor has met or exceeded all performance requirements to date, the performance criteria for this program remains classified and a before and after TSPR analysis is not possible.

The historical experience of the contractor as well as the well defined, mutually agreed upon metrics has helped keep system performance at high levels. However, these system performance metrics have always required high scores due to the strategic importance of our national missile defense. Therefore, the contractor can only offer marginal improvements in these key areas. In addition, the contractor acts only as an integrator with organic and depot maintenance provided by the government. So, increases in system performance may be due to the government maintainers.

The SBIRS High contract provides even less evidence for rejecting this proposition. The system has not been fielded, as of yet, so system performance is difficult to gage. Moreover, the schedule for SBIRS High has slipped by at least eighteen months. One reason for the schedule slip was inconsistent funding. Funds were diverted from this program in the early stages of the acquisition. Schedule risk caused by funding uncertainty would occur with or without the use of TSPR.

However, TSPR may have played a role in the increased schedule risk. Traditionally the government has made extensive use of program oversight to achieve

schedule and performance goals. In past programs, the government would be responsible for design, configuration, and modifications to a system under development. In TSPR, the contractor is required to decide how a system will work in order to meet the government's requirements. The shift in roles can be problematic in the commercial sector and is even a greater cultural and behavior change in the DoD environment. After conducting interviews with program personnel, all agreed that the TSPR structure contributed to inertia between contractor and government in developing the weapon system. Although the affects on performance may not be quantifiable, the agreement and experience of all the interviewees lends credibility to attributing part of the performance problems to TSPR.

Analysis of Proposition 2 Variables.

Performance Criteria – Clear defined, mutually agreed upon, and accurate performance criteria were consistently listed as pre-requisites for increased system performance under TSPR. In is difficult to evaluate a contractor on system performance if it is not clear what is being measured or if the measures accurately reflect important performance characteristics of the system.

Evaluations – While there was no one evaluation report that specifically addressed TSPR, both programs had evaluation reports that quantifiably measured performance under the TSPR arrangement. The evaluation measures were accuracy, availability, reliability, and survivability for the ICBM program. Operational availability will be used to evaluate contractor performance in the SBIRS program when the system is fielded. Unfortunately, these evaluation reports were sometimes found to be

incomplete by the GAO or tended to oversimplify the reasons for increased performance in a particular system (GAO, 2000: 11).

Proposition 3

Proposition 3: Total System Performance Responsibility does not affect public-private support capabilities.

Predicted: Total System Performance Responsibility affects public-private support capabilities.

Variables: Core activities, non-core activities, capability, compatibility

Results: The proposition is not rejected.

Analysis of Proposition 3.

It is hoped that the use of TSPR will produce an optimal balance of public-private support capability. However, it is very difficult to reject the proposition when users and Air Force decision-makers can not reach consensus on what our core activities are.

In the ICBM program the users had few concerns with the level of involvement of the contractor. This was primarily due to the fact that the contractor only acts as an integrator leaving organic and depot maintenance to the government.

The SBIRS High program went further in ceding operation and sustainment responsibility to the contractor. In these situations, the debate over optimizing public-private support becomes more contentious. Part of the reason lies in the provisions of the 50 – 50 rule and the other area of contention is the type of programs being selected for private support under TSPR.

Title 10 U.S.C. 2466, known as the 50 –50 rule, requires 50 percent of depot maintenance must be completed by government personnel. However, the increase in contractor support and the amount of contingency operations forced the Secretary of the

Air Force to waive the 50 – 50 rule for fiscal year 2000. There is much debate over the validity of the 50 –50 rule in the Air Force. Some view the rule as a necessary protection of core logistics competencies and surge capability while others believe the 50 –50 rule is a thinly veiled federal jobs program. There was division among the interview subjects concerning the 50 –50 as well and, like the identification of core competencies, no consensus was reached.

There was concern among some interviewees over the types of programs being selected for contractor support. By selecting newer programs for private support and leaving older programs to government support, the Air Force may be sacrificing a core competency of supporting surge requirements in a contingency environment. The 50 –50 rule was put into place to ensure excess capacity and the support of newer systems ensures the expertise needed to meet surge requirements.

The debate on how far to outsource operations and maintenance capabilities will continue as more weapon systems become candidates for TSPR. It would appear that the optimal formula of public-private support has not yet been reached, or at the very least, is not agreed upon by all parties involved.

Analysis of Proposition 3 Variables.

Core Activities and Non-Core Activities – These variables were mentioned by users in the discussion of the types of activities ceded to the contractor under TSPR. Many users made the implication of reducing non-core activities and concentrating on those that are core. However, there was not always consensus on what activities should be considered core or non-core.

Capability – Users and contractors formed partnerships under TSPR to take advantage of capabilities the user did not possess. Examples of these capabilities include inventory management, information services, and system engineering and technical assistance. The increasing cost and expertise needed to retain capabilities in-house contributed to the use of TSPR.

Compatibility – Both contractors and users indicated that the ability to work together to solve problems was critical to the success of the partnership. Because of this desire compatibility was a very important factor in determining whether TSPR would bean optimal acquisition strategy.

Proposition 4

Proposition 4: There is no change in the relationships among contractor, users, and system program office personnel under Total System Performance Responsibility.

Predicted: At least one relationship changes when Total System Performance Responsibility is implemented.

Variables: Contract terms/conditions, communication, incentive structure

Results: The proposition is rejected.

Analysis of Proposition 4.

The use of TSPR can be a radical departure from traditional government oversight and the risk associated with that oversight to insight and the risk shifted to the contractor that accompanies the additional freedom of formulating the "how." Many interviewees believed the change in relationship between contractor and system program office was obvious. From both case studies the relationship change and amount of adjustment required is often underestimated. Defense contractors have grown accustomed to the

DoD environment of oversight. Moving to new roles requires skillful change management and was significant lesson learned of the ICBM TSPR experience (ICBM SPO, 2000).

The role between contractor and user is enhanced as well. Partly due to acquisition reform initiatives, users have been able to display greater freedom of communication with contractors. TSPR encourages this because the contractor is essentially forming a long-term partnership with the government to satisfy the end users requirements. For TSPR to succeed, user input must be sought and valued by both the contractor and system program office personnel.

Even the relationship between system program office personnel and users changes under TSPR. TSPR causes extra linkages and dependencies between the SPO and the users. When operations and maintenance work is outsourced, the user must express requirements through an added layer of contract management and an additional MAJCOM. The long-term nature of TSPR contracts makes early and continued user involvement a must for success. The responses from the interviews concerning change are listed in Table 4. The responses of the interviewees were divided into three nominal categories; those that believed TSPR caused no significant changes in the current relationship, those that believed some relationship changes had occurred, and those that indicated significant changes from the pre-TSPR relationship. From the responses it is apparent that all the relationships have experienced some change with the SPO/Contractor relationship changing the most significantly. The factors of the relationship change identified most frequently are listed in Table 5.

Table 5, Relationship Changes

Interview Responses	No Change	Some Change	Significant Change
SPO vs. Contractors	0	0	16
SPO vs. Users	2	9	5
Users vs. Contractors	4	10	2

Table 6, Relationship Change Factors

Factor	Number of Times Identified
Oversight to insight shift	13
Transfer of responsibility	13
Involvement of user	9
Increase in communication	8
Personnel reductions/changes	7

Analysis of Proposition 4 Variables.

Contract Terms/Conditions – The use of a TSPR clause was listed by SPO personnel as a primary way of defining the changing roles and relationships. Terms such as extra option years that were tantamount to long-term contracting were listed as significant variables to measure changes in relationships. The added length of TSPR contracts is evidence of strategic partnerships and a move away from arms length relationships.

Communication – Changes in communication were frequently listed as evidence of the change in relationships. The responses of interviewees indicated that the amount and frequency of communication rises substantially under TSPR. The interviews and documentation also indicated that increased collocation of contractor and government personnel under TSPR further enhanced communication. Examples include contractor personnel assigned to program offices and Detachment 11, SMC and the new Inert Repair

Center for the PSRE LEP element of the ICBM program, which houses both contractor and government personnel working under the direction of the prime contractor.

Incentive Structure – Contractual incentives are also evidence of changes in relationships. The set-up of the award fee determining board and the relative voice of each member reflects changes in relationships. Interviewed SPO personnel, users, and contractors associated with the ICBM program believed the user's role has been enhanced by increased representation on the board and increased weight of their vote. Various cost sharing incentives also mark a change in relationship between contractor and government. Cost sharing typically fosters more collaboration in the buyer-supplier relationship. Both the contractor and SPO personnel stated the need for risk sharing in order to align the goals of the firm and the government. This principle is also stated as a necessary step towards successful TSPR implementation in the Army's report on constructing successful business relationships (Army Acquisition Office, 2001).

Proposition 5

Proposition 5: Total System Performance Responsibility does not affect operational flexibility.

Predicted: Total System Performance Responsibility affects operational flexibility.

Variables: Mission risk, resource control

Results: The proposition is rejected.

Analysis of Proposition 5.

The research indicates that some operational flexibility is compromised by TSPR and TSPR-like contractual arrangements. With a long-term partnership comes a long-term financial obligation to the contractor. Some of the users referred to this

phenomenea as a "must pay" bill. The long-term partnership between contractor and government may reduce operational decision-makers funding flexibility. When budgets are reduced, the users are already committed to the TSPR contract; therefore, budget cuts must come in other wing O&M requirements. Multiple interviewees from all dimensions of the two programs also commented on the difficulties in executing, transferring, or modifying funding on TSPR contracts. Several interviewees noted that financial reform has not caught up with acquisition reform in this arena. The large number of contract line items and accounting classifications made vendor payment more manpower intensive and made optimization of funds more difficult (ICBM SPO, 1999).

Programs that use private support under TSPR also risk reducing the flexibility of operational decision-makers. Public support and maintance of weapons systems allows operational comanders an easily tapped resource of surge capacity. However, an opertional commander does not have the same authority over contractor provided support and mainatenance. Some TSPR contracts provide for contractor surge capacity, but the operational decision-maker no longer has direct control of these resources and must often coordinate with system program personnel to exercise operational flexibility.

Analysis of Proposition 5 Variables.

Mission Risk – The amount of risk in a given mission was directly related to the level of operational flexibility over personnel and a weapon system. An increase in mission risk was cited by several users as a consequence of TSPR. The reasons for this conclusion were the added dependence on contractors for support and sustainment, the risk of the contractor defaulting after the government reduces its operational capability,

and the erosion of core logistics capability through the increased sustainment outsourcing of new weapon systems.

Resource Control – Like mission risk, resource control caries directly with operational flexibility. The ability of operational decision-makers to control resources under TSPR was questioned by operators. Some users interviewed believed that TSPR would add an additional layer of bureaucracy to the operation and sustainment environment. Instead of an operational commander controlling government personnel, TSPR would place a contractual vehicle from another MAJOM and contractor personnel outside the authority of the operational commander in the operations and sustainment role. One suggesting for mitigating resource control problems is to create a wing commander controlled contract line item for elements that fall into the direct purview of the using organization. A locally controlled contract line item would cede some authority of contractor manpower to the operational commander (SMC & AFSPC, 2000: 9).

Chapter Summary

This chapter presented the results of the data collected for this study. The data collected was analyzed to determine if the research propositions were to be rejected or not rejected. The results were as follows:

Proposition 1 was rejected; programs that use TSPR appear to realize some cost savings.

Proposition 2 was not rejected; it is unclear whether TSPR has positive or negative affects on performance.

Proposition 3 was not rejected; it is unclear whether the current use of TSPR throughout the Air Force has a positive or negative influence on public-private support capabilities.

Proposition 4 was rejected; TSPR causes changes in all relationships examined among contractor, system program office, and users.

Proposition 5 was rejected; TSPR does affect the operational flexibility of operational decision-makers.

The next chapter presents the conclusions and recommendations of this research.

V. Conclusions and Recommendations

Introduction

The previous chapter presented the data gathered during the study and evaluated the data for rejection or non-rejection of the research propositions. This chapter takes that information and answers the research questions. The research questions are answered in order and the significant findings follow each answer. The chapter ends with conclusions drawn from the research and recommendations for future studies.

Problem Statement

TSPR has already been championed as a best practice in acquisition reform. However, while some success with TSPR has been reported in various programs, it is unclear how well the goals and objectives of TSPR are being met.

The intent of this research is to examine how well the goals and objectives of TSPR have been met in two radically different weapon systems. By conducting an academic exploration and examination of the use of TSPR in weapon systems, future decision makers will be better equipped to refine, tailor, and implement TSPR as an element of an acquisition strategy.

Research Questions

The research questions supported the purpose of the study and assisted in evaluating programs that have used TSPR as part of an acquisition strategy. To guide development of research propositions the following five research questions were constructed:

1. How has TSPR affected total ownership costs?

2. How has TSPR affected performance?

3. How does TSPR affect public-private support capabilities?

4. How has the relationship among user (operator), contractor, and program manager changed under TSPR?

5. How does TSPR maintain operational flexibility?

Results and Management Implications for Research Question 1

How has TSPR affected total ownership costs?

TSPR allows savings in personnel costs through SPO reduction, cost reduction through various contractual incentives, and savings through partnering and the use of best commercial practices.

Significant Findings.

In nearly every program studied, there has been a high degree of correlation between personnel reduction and the implementation of TSPR. By reducing the number of sustainers, SPO personnel, and contractor infrastructure, total ownership cost can be reduced. SPO size reduction has been a recent acquisition reform lightning bolt and TSPR has been an effective means to achieve this goal. The SBIRS SPO has or will reduce manpower by 50 percent and the sustainment side will reduce from 107 personnel to 41 personnel by 2006, a 62 percent reduction. The ICBM saw significant reductions in the contractor infrastructure as a result of TSPR and the integration role filled by the prime contractor, TRW. Contractor manpower was reduced by 30 percent due to the elimination of the SE/TA contract.

A contractor may bring about savings through TSPR by employing best commercial practices, a superior supply chain, and using the added freedom and

responsibility under TSPR to aggressively manage obsolescence. The F-117 and Apache Helicopter are prime examples.

The type of incentives and level of risk and reward sharing affect the potential for cost savings. Some successful TSPR contracts use a three-prong approach to encourage RTOC: award fee, incentive fee, and cost savings sharing.

Implications for Air Force Decision-Makers.

When considering potential TSPR cost savings, decision-makers must consider more than a potential reduction in SPO size. The savings in personnel cost may be offset by cost growth in future program years. The decision to use TSPR is dependent on the ability of the contractor to partner with the government and create financial linkages. Some contractors can make great partners if the proper conditions exist; e.g., trust, appropriate roles and role definition, mutual risk and benefit sharing. The emphasis of cost reduction should come from efficiencies developed in the long-term partnership, not the quick personnel reductions.

Results and Management Implications for Research Question Two

How has TSPR affected performance?

Despite the apparent success of smaller aircraft fleet using TSPR it is unclear whether TSPR directly results in increased performance.

Significant Findings.

Many programs that employ TSPR state quantifiable performance goals up front. However, there are not enough years of data in most programs to determine if TSPR causes a significant increase in performance. The ICBM PIC contractor has at least maintained performance and may have incrementally improved performance. Funding

instability has plagued the SBIRS High program, but the inertia caused by the change from oversight to insight contributed to schedule delays.

In a report to the GAO, the Air force asserts that mission capable rates were higher for aircraft systems wit TSPR (F-117, KC-10, and C-17) than for other systems not supported by this type of support strategy. However, the GAO dismisses this claim by pointing out some of the advantages that may have contributed to the higher mission capable rates. The aircraft systems with TSPR typically were newer with smaller fleets. Therefore, fewer maintenance problems and a less complex supply chain probably contributed to the increased performance. The older aircraft not using TSPR (F-15, F-16, KC-135, C-5, and C-141) have larger fleet sizes, which leads to more maintenance problems and a more complex supply chain (GAO, 2000: 11).

Implications for Air Force Decision-Makers.

There are many factors that account for increases or decreases in performance. The data in this study is inconclusive concerning TSPR's affect on performance. Moreover, the larger set of data that compromised the GAO report does lend itself to conclusions about TSPR and increased performance. With this in mind, decision-makers should be cautious when claiming increased performance based solely on TSPR.

Results and Management Implications for Research Question Three

Does TSPR affect public-private support capabilities?

It is not clear whether TSPR optimizes public-private capabilities. The use of TSPR contracts that outsource non-core support and sustainment functions is how TSPR attempts to optimize public-private capabilities. However, there is not clear consensus on what Air Force core competencies are in support and sustainment.

Significant Findings.

The use of private support capabilities continues to rise in the Air Force. In fiscal year 2000, the Secretary of the Air Force was forced to issue a waiver to the 50 –50 rule. In future years, the Air Force projects to come close to exceeding the 50 percent limit of private support capability. Out of 127 systems and subsystems identified in a GAO report, 75 of them use or plan to use forms of multifunction, long-term contractor support.

In general, the Air Force seems to retain the older weapon systems with more complex supply chains and maintenance issues. The newer weapon systems are candidates for TSPR. This is a pattern that could threaten or reduce an Air Force core competency of supporting requirements in a contingency situation. Maintaining this core capability requires depots to establish repair capability for new modified systems.

Implications for Air Force Decision-Makers.

The decision to use of TSPR in support and sustainment of a weapon system may be based on an individual's view of the 50 –50 rule. Some view the rule as an artificial constraint or even a federal jobs program that protects public depot workers. Public depot advocates view the 50 –50 rule as a necessary safeguard in surge capacity. Nonetheless, even this surge capacity may be threatened if depots continue to support the older systems, while support and sustainment of newer systems is placed with contractors. The growth of contractor support and sustainment raises additional issues such as contractors on the battlefield.

Results and Management Implications for Research Question Four

How has the relationship among user (operator), contractor, and program manager changed under TSPR?

The relationship between contracor and program manger has changed from oversight to insight. The level of collaboration and partnering has increased under TSPR. The user's relationship with the contractor has taken on new importance. Prior to TSPR this relationship barely existed. Finally, the relationship between user and program manger now has additional linkages and dependencies.

Significant Findings.

TSPR causes major cultural and behavioral changes between contractor and program manager. The added responsibility of system design to operational support requires the contractor to be more innovative and proactive. It also causes a collaboration between the program management office and the contractor. The two are much more dependent on one another through TSPR. Increased communication becomes important and collocation of contractors and SPO personnel is common.

The user/contractor relationship takes on new importance. Prior to acquisition reform, communication between users and contractors was purposely kept to a minimum. Under TSPR, the user can now collaborate with the contractor and often eliminate the need to use the program office personnel as a go-between.

The relationship between program manger and user changes slightly under TSPR. The user is required to participate earlier in the development of requirements in order to ensure the success of the program. The user may experience additional dependencies on the program office due to the TSPR arrangement.

Implications for Air Force Decision-Makers.

The need for change management is great when adopting a TSPR acquisition strategy. Government and contractor roles change dynamically due to TSPR and the cultural changes required to adapt to the new rules can not be underestimated. TSPR calls for a collaborative relationship between both parties in the government and the contractor. However, developing successful partnerships and collaborative efforts takes an enormous investment of time and resources. Additionally, the right conditions of trust, clearly defined roles, cross-organizational behavior, and mutual risk and reward sharing need to be in place to foster the collaborative process.

Finally, the voice of the user must increase under TSPR. The potential outsourcing of operational and support capabilities makes the user even more dependent on systems program office personnel and contractors. The lines of communication between the user and contractor should be wide open and the user must have some control over contractual incentives such as award fee.

Results and Management Implications for Research Question Five

How does TSPR maintain operational flexibility?

TSPR compromises some operational flexibility in the areas of funding flexibility and resource control. An operational decision-maker may be forced to work with another command in charge of contract management instead of directing military personnel resources to meet changes in mission requirements.

Significant Findings.

Financial reform has not caught up with acquisition reform in some areas. The ICBM TSPR contract was bogged down with Contract Line Item Numbers (CLINs) making contract and funds management difficult. However, the ICBM program office was successful in eliminating and combining CLINs to make funding flexibility more manageable.

The outsourcing of support and sustainment has the potential to erode operational flexibility. Contractors may replace Air Force personnel that were once under the control of the operational commander. Because the operational commander does not have direct authority over contractors the level of operational flexibility decreases.

Implications for Air Force Decision-Makers.

The long-term nature of TSPR contracts creates "must pay" bills. When budget uncertainty or cuts become a reality, the operational commander has fewer options due to the commitment to the TSPR contract. Some possible solutions include a stable funding environment and flexible sustainment. Varying levels of sustainment could be achieved with an operational controlled CLIN. This CLIN could have minimum levels of sustainment guaranteed to the contractor, but would permit adjustments according to funding and mission requirements. The level of support or sustainment can be changed to reflect budget uncertainties or cuts. When evaluating a candidate program for TSPR, decision-makers must consider the level of operational flexibility required to meet mission requirements.

Recommendations for Future Research

One hindrance of this research effort was the limited number of programs with significant data on TSPR. According to the GAO, 75 of the 127 systems and subsystems currently managed are using or planning to use various forms of multifunction, long-term contractor support (GAO, 2000: 9). Therefore, there will be much more data available on the successes and limitations of TSPR as programs form a history with this acquisition strategy concept. With such an increasing dependence on contractor support, it is imperative to study the use of TSPR to determine the best implementation and management strategies.

Another area for future study is the challenge to meet the 50 – 50 ceiling and the potential outsourcing of core Air Force depot competencies. The 50 –50 ceiling, the Secretary of the Air Force for fiscal year 2000 waived 10 U.S.C. 2466. Preliminary Air Force data also indicates that the Air Force will approach or exceed the 50 percent ceiling through fiscal year 2004 (GAO, 2000: 2).

Some would argue that the 50 percent ceiling is an artificial constraint and the Air Force should be allowed to outsource depot capabilities to optimize public-private support capabilities. However, some depot operators are concerned that the increased level of outsourcing diminishes the Air Force's surge capacity. More importantly, there is concern over what types of programs become candidates for private depot support. Some officials have raised concerns over the lack of new programs going to public depots for sustainment. While the current government depots retain in-house capabilities for older weapon systems, they may be losing their core capability of supporting

requirements in a contingency situation. Maintaining this core capability requires depots to establish repair capability for new modified systems.

Research Summary

This study was undertaken to determine the level of success programs have experienced with TSPR as an element of the acquisition strategy. The purpose of this study was to report the results current programs have with TSPR, determine characteristics of successful public-private partnerships, and to discuss the implications and recommendations for Air Force decision-makers.

Research propositions and research questions were developed to meet the purposes of the study. A qualitative research methodology was chosen using multiple case studies. A three-part research design of validation and selection, data collection, and data analysis was used to implement the methodology. System program office personnel, contractors, and users were administered the research protocol. Data was then compared using predetermined research variables.

The results revealed cost savings through TSPR, a definite change in all relationships among contractor, user, and system program office personnel, and the occasional hindrance of operational flexibility. It was not made clear by this study if TSPR has an effect on program performance or if TSPR truly optimizes public-private support capability.

Information gathered in this study indicates that collaboration and partnering with our major defense contractors is a lengthy process that requires much cultural change. There are potential rewards for all parties through collaboration, but the process requires innovation and initiative of all the parties.

Appendix A: TSPR Research Protocol

This research protocol was developed to collect information from TSPR users, system program office personnel, and contractors. The interviewees were not given the research propositions, but they are provided to the reader. Propositions are stated in the null case first, then the questions pertaining to that proposition are listed. Responses provided to the questions are listed after each question.

Research Protocol

Proposition 1: Total System Performance Responsibility does not cause changes in total ownership cost.

Has the program you work for experienced cost savings as a result of TSPR?

Yes, $1.2 billion over 15 year contract
Yes, some savings from government estimate around 10 percent,
No significant savings

From where did the cost savings come?

Immediate contract savings from the government estimate
Reduced contractor infrastructure
Contractor manpower reductions
Contractor Logistics Support proposal
Reduced oversight role of government
Contractor innovation or proposed innovations
Competition for contract
Reduced government manpower

Did the program experience personnel reductions?

No SPO reduction
Operation and sustainment remained in-house
Contractor manpower/infrastructure reduced by 30 percent
SPO reduced by 50 percent
Operation and sustainment will reduce by 61 percent by 2006

Were these reductions part of the savings?

Reductions factored into savings

Yes, when compared against contractor's cost for equivalent work

Has the program experienced any RTOC?

Yes, $7.3 million in FY 98, $2.3 million in FY 99 before fee
No RTOC savings as of yet

Does the contract include risk sharing through cost overrun/underrun savings?

RTOC 50/50 share on all savings
No cost sharing or cost savings
Award fees up to 20% every six months

Proposition 2: Total System Performance Responsibility does not cause changes in performance.

What are the performance criteria for the TSPR contract?

Accuracy, reliability, availability, and survivability
Operational availability, reliability

How do the performance criteria factor into contractual incentives?

Systems performance criteria are 45 percent of award fee criteria
Unsatisfactory on systems performance criteria results in no award fee
Systems performance weighted into six-month award fee determination
50 percent of award fee is designated for CLS performance

Are the performance criteria objective, well understood, and agreed upon?

Yes, performance criteria have existed for years and have remained unchanged
Performance criteria accurately reflects mission requirements
Contractor had years of experience to understand criteria
Software development, hardware maintenance requirements were too undefined
Some design criteria not clearly understood
Requirements may not be fully known resulting in nebulous performance criteria

Has TSPR influenced contractor performance?

Forced contractor to change from old task oriented nature of operating
Resulted in a closer partnership with government representatives
Needs of warfighter more clearly understood

Gives contractor incentive to control costs through cost savings sharing and structure of award fee
Required major cultural change for the contractor in performance
Contractor was unsure of how to respond to extra latitude in design and development
TSPR caused contractor (and government) inertia

Has any change in performance been linked to TSPR?

Some schedule slippage must be attributed to TSPR
Cost avoidance measures implemented by contractor in response to TSPR arrangement
Met or exceeded all performance criteria under TSPR

Proposition 3: Total System Performance Responsibility does not optimize public-private support capabilities.

What are the core activities in this program?

Program management
Contract management
Budget/financial execution
Security
Some organic-level maintenance
System operation
Tech control
Requirements definition

What are the non-core activities in this program?

Organic-level maintenance
Design development formulation
Performance responsibility
Data compilation
System operations

Has TSPR implementation resulted in an outsourcing of core activities?

Yes, organic capability will cease after system is fielded
Yes, government did not require data rights, which threatens core capability
No, the goal of the TSPR contract was to consolidate risk with the contractor

No, government still retains organic-level maintenance
Possibly, if contractor defaults, government may have difficulty operating fielded system

Is the mix of public-private support capabilities optimal in this program?

No, too much risk for contractor non-performance
No, too much dependency on contractor
No, contractor could take additional role in support capability
Yes, contractor works as integrator with government retaining specific core functions
Yes, contractor support was necessary with reduction in force and need for mission resources in other areas.

Proposition 4: There is no change in the relationships among contractor, users, and system program office personnel under Total System Performance Responsibility.

Has the relationship between contractor and user changed under TSPR?
Has the relationship between contractor and SPO changed under TSPR?
Has the relationship between SPO and user changed under TSPR?

See Table 4

What has significantly changed in the relationship(s)?

See Table 5

How have program personnel adapted to the change in relationship(s)?

Slow to respond
Continue as if there's no change
Increased level of partnering with the contractor
Increased customer focus on end user
Reduced amount of oversight into contractor activities
Increased communication with contractor to make up for explicit oversight instructions

Has senior management taken any actions to mitigate the affects of change?

Instituted mandatory change management briefing for all personnel
No significant action

Proposition 5: Total System Performance Responsibility does not impede operational flexibility.

Has TSPR had any affects on operational flexibility?

TSPR has not impeded operational flexibility
TSPR creates must pay bill for operational wings
Added layer of bureaucracy created through AFMC contract vehicle
Decreased personnel resource control for operational commanders
Surge capability hindered by contractor personnel

What changes are needed in the TSPR contract structure to ensure operational flexibility?

Reduced CLINs, ACRNs, EEICs,
Wing commander controlled CLIN for some items
Stable funding
Indefinite delivery/indefinite quantity (IDIQ) ordering options to mitigate reduced funding

Does the "must pay" bill created by TSPR differ from any other long-term contractual relationship?

No, most contracts have funding problems and are must pay bills
No, any long-term commitment requires stable funding
Yes, TSPR contracts seem to have a more complex funding structure that stretches over multiple commands creating funding problems

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Vita

Captain Christopher P. White was born in Des Moines, Iowa. He graduated from Lincoln High School in Lincoln, Nebraska in June 1988. He enlisted in the Army in 1988 and served on active duty until 1991. After active duty, he attended Calvin College in Grand Rapids, Michigan where he graduated with A Bachelor of Arts degree in Math and Business in 1994. He entered Officer Training School in 1995 and was commissioned in 1996.

His first Air Force assignment was at Eielson AFB, Alaska as a contracts manager for the 354th Contracting Squadron. In 1998 he become the commodities flight commander. In September 1999, he entered the Graduate School of Engineering and Management, Air Force Institute of Technology. Upon graduation, he will be assigned to ASC at Wright-Patterson AFB, Ohio.